

Memoirs of the

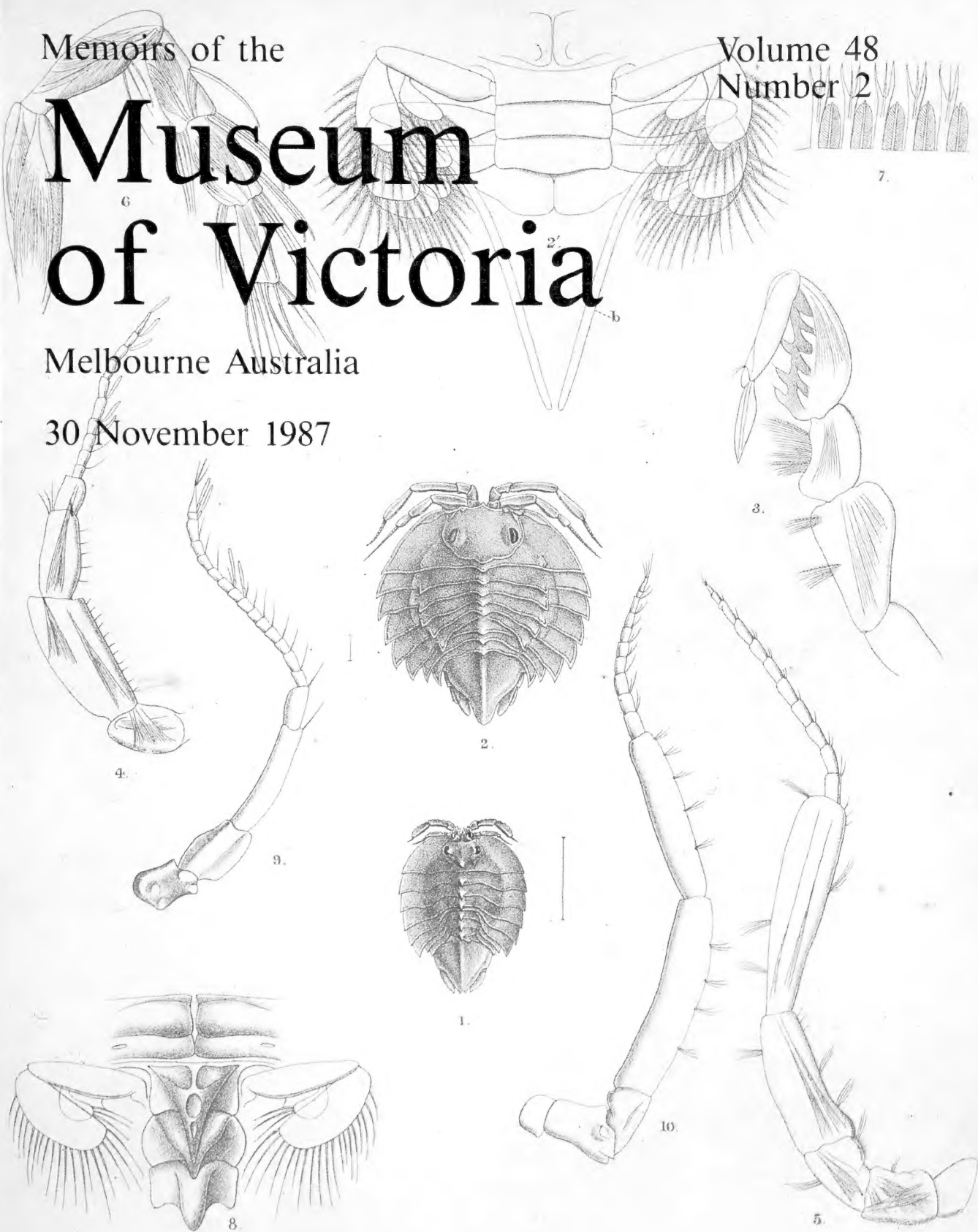
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Museum of Victoria

Melbourne Australia

30 November 1987



1. SEROLIS PALLIDA, Beddard.

2-7 SEROLIS MINUTA Beddard.

8-10. SEROLIS LONGICAUDATA Beddard.

Cover: The expedition of H.M.S. "Challenger" circled the world between 1873 and 1876 investigating the biology of the oceans. One of the numerous crustaceans collected by dredging was the isopod originally described by F. E. Beddard as *Serolis minuta* and figured on a plate, reproduced here, in the 1884 *Report on the Scientific Results of the Voyage . . .* The species, collected from near the entrance of Port Phillip Bay, becomes the type species of a new genus, *Serolina*, erected by Gary Poore in this issue.

MEMOIRS
of the
MUSEUM OF VICTORIA

MELBOURNE AUSTRALIA

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Number 2
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The *Occasional Papers* are research documents of sufficient importance to be preserved but which are not appropriate for primary scientific publication. Papers are factual rather than interpretative studies, may be of special local interest or may be longer than a normal scientific paper. Contributions will be refereed if appropriate.

Two copies of the manuscript with accompanying plates and figures should be submitted to the Editor, Museum of Victoria, Swanston Street, Melbourne, Victoria 3000. Authors should consult a recent volume of the *Memoirs* to acquaint themselves with format.

Manuscripts must be typed on A4 paper, double-spaced, on one side of the paper and with

ample margins. Text on word-processor floppy disks will be accepted and are preferred. Papers should be arranged as follows: title (including higher classification of zoological taxa); authors' names and addresses; abstract; contents (only if the paper is very long); introduction and main text; acknowledgements; references; index (only if very long); and tables. Captions to text figures and plates must be attached to the manuscript as final pages. Underlining in the text should be restricted to generic and specific names. Measurements must be in the metric system (SI units).

References should be listed alphabetically at the end of the manuscript. Journal titles should be in full. References to books must give the year of publication, edition, name of publisher and city of publication.

In taxonomic papers synonymies should be of the short form: taxon, author, year pages, figures. A period and dash must separate taxon and author except in the case of reference to the original description.

Photographs must have clear definition and may be submitted as either glossy or flat prints at the actual size for reproduction. Line drawings for text figures should be in black ink on white card or drawing film. Maximum full-page size is 147 mm wide by 198 mm, single column width is 72 mm. Clear lettering must be inserted. Original drawings up to twice final size are acceptable.

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TWO NEW GENERA OF LEPTOPHLEBIIDAE
(INSECTA: EPHEMEROPTERA) FROM SOUTH-WESTERN AUSTRALIA

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Abstract

Dean, J.C., 1987. Two new genera of Leptophlebiidae (Insecta: Ephemeroptera) from south-western Australia. *Mem. Mus. Vict.* 48: 91-100.

The genera *Nyungara* and *Bibulmena* are established for three species of leptophlebiid mayflies from south-western Australia. Diagnostic features of the two genera are presented, and descriptions are provided of the male imago, female imago and nymph of both *N. bunni* sp. nov. and *B. kadjina* sp. nov., and the male imago and female imago of *N. ellitasha* sp. nov. Both genera are known only from south-western Australia, and are perhaps endemic to the region.

Introduction

The mayflies of Western Australia are poorly known, and only two publications have included species identifications. Ulmer (1908) recorded the leptophlebiids *Atalophlebia furcifera* Eaton and *Atalophlebia inconspicua* Eaton and the baetid *Baetis soror* Ulmer from south-western Australia, and in a later publication (Ulmer, 1916) he recorded the baetid *Cloeon viridis* Klapálek from the Kimberley district of north-western Australia. The type locality of *A. inconspicua* is Adelaide and there have been no additional records from Western Australia. Confirmation of Ulmer's identification will require examination of his original material. I have, however, examined the holotype of *A. furcifera* which is lodged in the Museum of Victoria and Ulmer's figures certainly do not represent this species. The type locality of *A. furcifera* is Melbourne and there is no evidence that the distribution extends to Western Australia. Riek (1970), without giving details of species identifications, has reported that one species of *Tasmanocoenis* and one species of a genus close to *Atalonella* occur in Western Australia. In the present paper three new species of Leptophlebiidae are described from south-western Australia, and two new genera are established to accommodate them. Additional species have been recognised, and these will be described as more material becomes available.

Material and methods

Much of the material on which the descriptions are based has been collected by Dr Stuart Bunn during an ecological study of the macroinvertebrates of several small streams flowing through jarrah forests in the Darling Range. Precise locations of his study sites were given by Hynes and Bunn (1984). Additional material has been examined from the collections held by the Museum of Victoria, Melbourne. Colour descriptions and measurements are based on ethanol preserved specimens. Holotypes have been lodged in the Museum of Victoria and paratypes have been lodged in the Museum of Victoria (NMV) or retained in the author's collection (JCD).

Genitalia and nymphal parts have generally been drawn free-floating, and subsequently prepared for detailed examination by clearing in potassium hydroxide or mounting in polyvinyl alcohol-lactophenol mountant. Although slide preparation causes distortion of genitalia it is considered essential if details of spines and setae are to be examined. Wings have been dry mounted, photographed and transparencies projected onto a wall for tracing. All measurements have been made using an eye-piece graticule.

Nyungara gen. nov.

Diagnostic features. Imago. Forewing (Fig. 1)

Nyungara gen. nov.

Diagnostic features. Imago. Forewing (Fig. 1) hyaline, costal and subcostal cells in apical third of wing translucent, whitish. Length-width ratio 3.2-3.8. Basal to the bulla 3 to 5 costal cross veins, and 10 to 15 costal cross veins distal to the bulla. MP_2 attached by cross vein to MP_1 at 0.26-0.32 distance from base to wing margin. ICu_1 not linked to $CuA-CuP$ cross vein; base of ICu_1 attached to CuA by cross vein. ICu_1 and ICu_2 parallel as wing margin approached. Forewing 6.7-9.7 times length of hindwing, which is greatly reduced. Hindwing with pronounced angular projection on costal margin (Figs. 2, 11). Vein Sc joining costal margin at 0.65-0.85 wing length. Fork MP without an intercalary. Tarsal claws similar, each with an apical hook and an opposing ventral flange (Fig. 9). Male imago with penis lobes fused in basal half, either partially fused or separated by narrow cleft in apical half (Figs. 6, 7, 10). Each lobe with sub-apical dorsal spine, directed inwards. Length of styliger plate along midline 0.31-0.36 maximum width. Female imago with a small genital extension on posterior margin of sternum 7. Ninth sternum of female imago with shallow apical cleft, width of cleft 2.7-3.7 times depth (Fig. 8).

Subimago. Wings uniformly pale grey-brown.

Mature nymph. Antennae about twice length of head. Mouthparts as in Figures 17-22. Lateral margins of clypeus diverging to anterior, labrum slightly wider than clypeus. Width of labrum about twice length, anterior margin with 5 broad denticles, extending over at least half maximum width of labrum. Outer margins of mandibles somewhat angular, tufts of hairs at midpoint. Incisors slender, prosthecal tuft well-developed. Galea-lacinia of maxilla with about 14 sub-apical ribbon-like pectinate setae, and sclerotised comb-like seta at inner end of row. Maxillary palp moderately small, middle segment with simple setae only. Labium with glossae not turned under ventrally, slightly dorsal to paraglossae. Terminal segment of labial palp narrow, approximately 3.0 times as long as broad. Terminal segment about 0.7 times as long and 0.65 times as wide as middle segment. Foreleg (Fig. 13) with sharp spines and scattered hairs along outer margin of femur. Tibia with scattered hairs along outer mar-

gin, and about 40 simple spines on ventral margin. Ventral margin of tarsus with 5-6 simple spines, tarsal claw with ventral teeth, progressively larger apically (Fig. 14). Postero-lateral spines on abdominal segments 5 (small) to 9. Gills double, on abdominal segments 1 to 7. Each lamella lanceolate, without lateral tracheae, similar on all segments (Fig. 15). Segments at mid-length of caudal filaments with apical whorl of triangular denticles and long setae (Fig. 16).

Type species. *Nyungara bunni* sp. nov.

Etymology. From Nyungar, a collective name the aboriginal people of south-western Australia used for themselves.

Remarks. The genus *Nyungara* can be distinguished from all other leptophlebiid genera by the following combinations of characters:

Imago: (1) forewing with ICu_1 not connected to $CuA-CuP$ cross vein (Fig. 1); (2) hindwing reduced, with pronounced angular projection on costal margin (Figs. 2, 11); (3) claws of a pair alike, with an apical hook and an opposing ventral flange (Fig. 9); (4) penis lobes with a sub-apical spine (Figs. 7, 10).

Nymph: (1) labrum broader than clypeus; (2) width of labrum about twice length (Fig. 17); (3) anterior denticles of labrum broad based, extending over at least half of maximum width of labrum (Fig. 17); (4) tarsal claws with ventral teeth, progressively larger apically (Fig. 14); (5) postero-lateral spines on abdominal segments five to nine; (6) gills double, lanceolate, on abdominal segments one to seven; (7) tracheae of gills without lateral branches (Fig. 15).

Nyungara is close to *Atalonella* Needham & Murphy which has representatives in both South America and eastern Australia. Peters and Edmunds (1972) designated *A. ophis* from Chile as the type species of *Atalonella* and provided information on the diagnostic characters of the genus. Adults of *Nyungara* are readily distinguished from *Atalonella* by several features including the reduced size of the hindwing, the well-developed costal projection on the hindwing, and the presence of sub-apical spines on the penis lobes. However, differences between nymphs of the two genera are slight. The five denticles on the anterior margin of the labrum of *Nyungara*

are broadly based and extend over at least half of the width of the labrum, whereas in *Atalonella* the denticles are narrowly based, with the middle denticle clearly larger than the laterals. In addition, the gill lamellae of *Nyungara* lack lateral tracheae while described nymphs of *Atalonella* possess gills with well-developed lateral tracheae. Within Australia leptophlebiid mayflies with *Atalonella*-like nymphs fall into at least four species-groups. The genus *Nyungara* is established here for one group which includes two species from south-western Australia. A second group of species can clearly be referred to the genus *Atalonella*, sensu Peters and Edmunds (1972), while a third group includes *Atalophlebia lucida* Ulmer for which Demoulin (1955) has established the genus *Thraulophebia*. Unfortunately, many species in the complex have been inadequately described and generic placements must await further studies.

***Nyungara bunni* sp. nov.**

Figures 1-9, 12-22

Leptophlebiidae species C, Bunn et al. (1986).

Type material. Holotype: Western Australia, Foster Brook, North Dandalup, S. Bunn, 22 Sep 1983, NMV T-8132 (♂ imago reared from nymph).

Paratypes: Western Australia. Foster Brook, North Dandalup, S. Bunn, 23 Jul 1982, NMV T-8133 (♂ imago reared from nymph, wings, forelegs, genitalia and nymphal parts on slides; figs. 1-6, 9, 16, 17, 20-22). Waterfall Gully, Jarrahdale, S. Bunn, 30 Aug 1982, JCD (♂ imago reared from nymph, genitalia cleared, fig. 7). Waterfall Gully, Jarrahdale, S. Bunn, 30 Aug 1982, NMV T-8134 (♀ imago reared from nymph, fig. 8). Waterfall Gully, Jarrahdale, S. Bunn, 16 Sep 1981, NMV T-8158 (♀ nymph, mouthparts and legs on slide, figs. 12-15, 18, 19).

Other material examined. Western Australia. Seldom Seen Brook, Jarrahdale, S. Bunn, various dates (1 ♂ imago, 1 ♀ imago, 8 nymphs). Waterfall Gully, Jarrahdale, S. Bunn, various dates (1 ♂ imago, 4 ♀ ♀ imagos, 1 ♂ subimago, 3 ♀ ♀ subimagos, 29 nymphs).

Description. Imago. Body length: ♂ 6.3-7.8 mm, ♀ 6.8-7.5 mm.

Forewing: ♂ 7.0-7.7 mm, ♀ 7.1-7.8 mm.

Male imago: Head and thorax medium brown. Upper portion of eyes orange-brown, lower portion black. Eyes separated on meson of head by distance of from half to almost full width of median ocellus. Forelegs brown, articulations of femora and tibiae, and tibiae and tarsi darker. Ratios of segments in forelegs 0.68: 1.00 (2.60 mm):

0.05: 0.32: 0.28: 0.21: 0.10. Mid- and hind-legs paler, yellow-brown, darker brown around articulations of femora and tibiae. Forewing 6.7-7.7 times length of hindwing. Costal projection of hindwing at 0.55-0.60 wing length; vein Sc joining wing margin at 0.65-0.70 wing length (Fig. 2). Abdominal terga brown, anterior third of most segments pale and often hyaline (Figs. 3, 4). Sterna paler yellow-brown. Penes reaching almost to middle of basal segment of forcep (Figs. 5, 6). Apices of penis lobes either in contact or separated by very narrow cleft (Fig. 6).

Female imago: General colour similar to male imago. Abdominal terga more uniformly brown, but with pair of small pale spots on anterior third of most segments. Eyes separated on meson of head by distance about 4 times maximum width of an eye. Forewing 7.7-8.1 times length of hindwing. Genital extension on sternum 7 broad and evenly rounded, projecting about 0.2 times length of sternum 8. Width of apical cleft on ninth sternum 2.8 to 3.2 times depth.

Nymph: Body length of mature nymph 6.2-6.7 mm. Head and thorax predominantly medium-brown, washed with paler yellow-brown as in Figure 12. Legs yellowish-brown, pale brown bands at about two-thirds length of femora, at base and middle of tibiae, and near middle of tarsi. Abdomen pale brown, terga with pair of small pale spots on anterior third of most segments. Sterna pale yellow-brown, usually without obvious markings.

Etymology. The species is named for Dr S. Bunn who collected the material.

***Nyungara ellitasha* sp. nov.**

Figures 10, 11

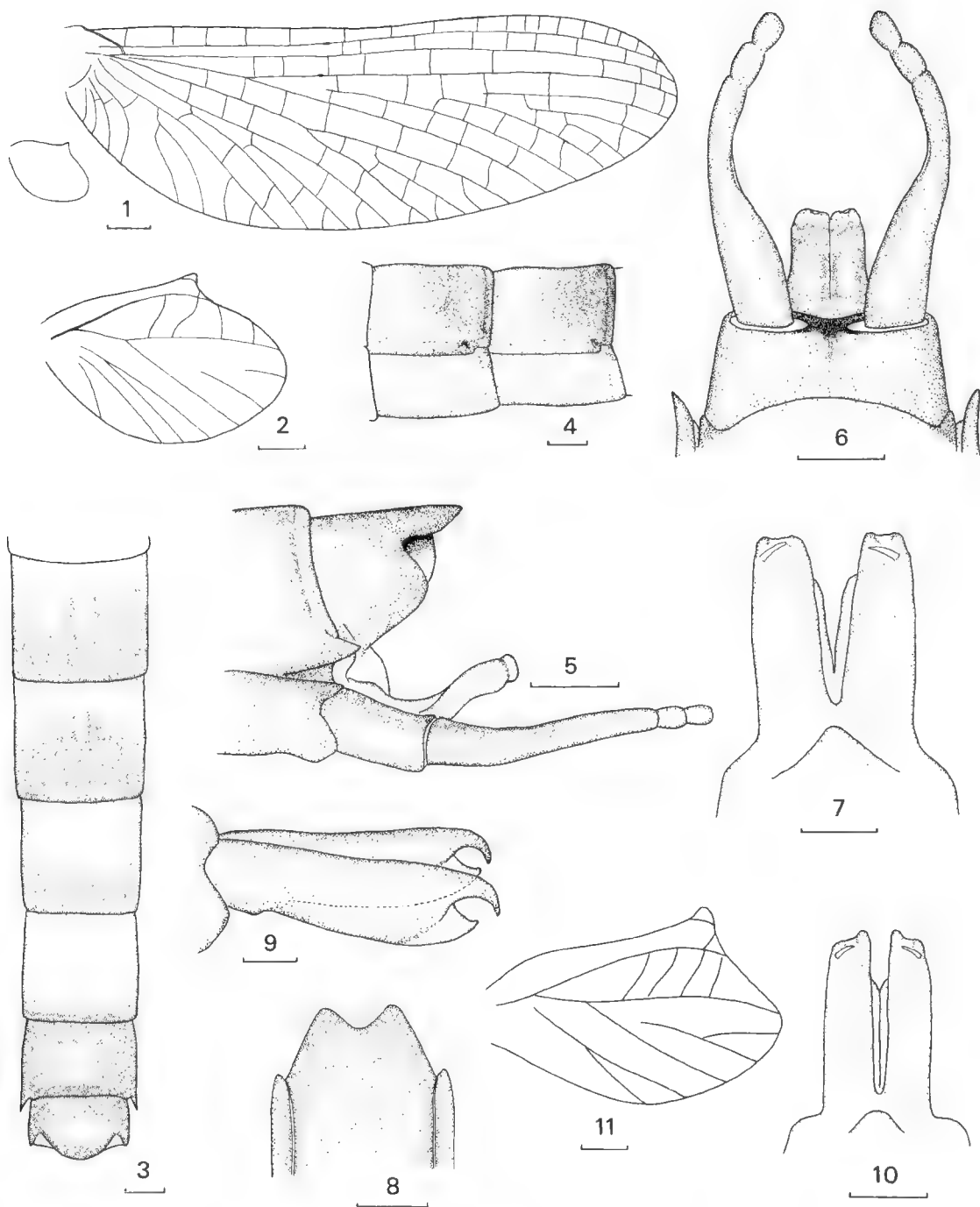
Type material. Holotype: Western Australia, Wungong Brook, Jarrahdale, S. Bunn, 6 Oct 1983, NMV T-8135 (♂ imago, genitalia cleared, fig. 10).

Paratypes: Type locality, NMV T-8136 (♂ imago, wings, genitalia and foreleg on slides, fig. 11); JCD (♂ imago, wings on slide); NMV T-8137 (♀ imago).

Other material examined. Western Australia. Wungong Brook, Jarrahdale, S. Bunn, 6 Oct 1983 (5 ♂ ♂ subimagos). Carbanup River, Marybrook-Vasse Road, J. Blyth, 5 Dec 1979 (4 ♂ ♂ imagos).

Description. Imago. Body length: ♂ 4.8-6.0 mm, ♀ 5.8 mm.

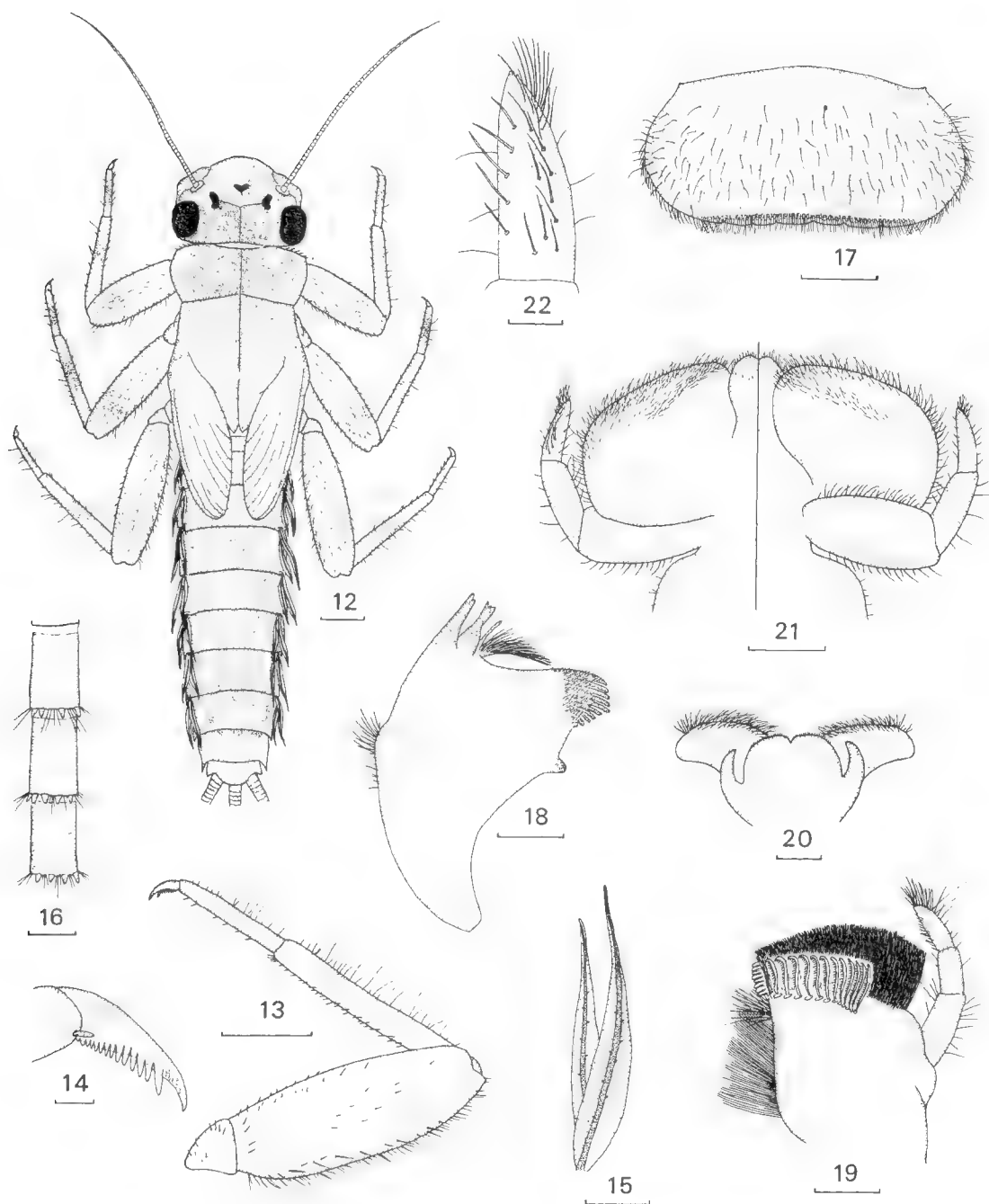
Forewing: ♂ 4.8-5.9 mm.



Figures 1-9. *Nyungara bunni*, imago. 1, wings, male imago; 2, hindwing enlarged, male imago; 3, abdominal segments 5 to 10, dorsal, male imago; 4, abdominal segments 5 and 6, lateral, male imago; 5, male genitalia, lateral; 6, male genitalia, ventral; 7, penis lobes, dorsal; 8, ninth sternum, ventral, female imago; 9 fore tarsal claws, male imago.

Figures 10-11. *Nyungara ellitasha*, imago. 10, penis lobes, dorsal; 11, hindwing, male imago.

Scale lines: 0.02 mm (Fig. 9); 0.1 mm (Figs. 7, 10, 11); 0.2 mm (Figs. 2-6, 8); 0.5 mm (Fig. 1).



Figures 12-22. *Nyungara bunni*, nymph. 12, whole nymph; 13, foreleg; 14, tarsal claw; 15, gills, abdominal segment four; 16, cercus midlength; 17, labrum; 18, left mandible, dorsal; 19, left maxilla, ventral; 20, hypopharynx; 21, labium, dorsal (left) and ventral (right) aspects; 22, terminal segment of labial palp, dorsal.
 Scale lines: 0.05 mm (Figs. 14, 16, 22); 0.2 mm (Figs. 15, 17-21); 0.5 mm (Figs. 12, 13).

Male imago: Head and thorax brown. Upper portion of eyes orange-brown, lower portion black. Eyes either in contact on meson of head, or separated by distance less than width of median ocellus. Forelegs brown, darker at articulations. Ratios of segments in forelegs 0.67: 1.00(1.84 mm): 0.06: 0.35: 0.35: 0.31: 0.12. Forewing 8.5-9.7 times length of hindwing. Costal projection of hindwing at 0.75-0.80 length of wing, vein Sc joining wing margin at 0.80-0.85 wing length (Fig. 11). Abdominal terga brown, paler than head and thorax. Usually no obvious markings although in some specimens a pair of inconspicuous pale spots on anterior third of some segments. Sterna pale brown. Apical third of penis lobes separated by narrow cleft (Fig. 10). Apices of penis lobes oblique, with inner angles projecting further than outer angles. Base of penis narrowing abruptly.

Female imago: (Only single specimen available for examination, both forewings damaged.) General colour similar to male imago. Abdominal terga uniformly pale brown, no obvious markings. Sterna pale yellow-brown. Eyes separated on meson of head by distance about 4 times maximum width of eye. Genital extension on sternum 7 broad, rounded, reaching about 0.2 along sternum 8. Width of apical cleft on ninth sternum 3.7 times depth.

Nymph: Unknown.

Etymology. The species is named for my children, Elliot and Natasha.

Remarks. *Nyungara ellitasha* is readily distinguished from *N. bunni* by the smaller size, the greater reduction of the hindwing and the more distal location of the costal projection of the hindwing. The penis lobes are more delicate, with the apices somewhat oblique as opposed to the more rounded apices of *N. bunni*. In addition, the base of the penis narrows abruptly in *N. ellitasha* whereas the narrowing is more gradual in *N. bunni*.

Bibulmena gen. nov.

Diagnostic features. Imago. Forewing hyaline; male imago with costal and subcostal cells hyaline except in apical third of wing, where they are translucent, whitish (Fig. 23), female imago with all costal and subcostal cells shaded pale brown.

Length-width ratio of forewing about 3.1. Basal to bulla 7-10 costal cross veins, about 20 costal cross veins distal to bulla. In apical third of wing costal cross veins anastomosed. MP_2 attached by cross vein to MP_1 at about 0.18 distance from base to wing margin. ICu_1 lined to $CuA-CuP$ cross vein. ICu_1 and ICu_2 diverging as wing margin approached. Forewing about 4.5 times length of hindwing. Costal margin of hindwing with shallow concavity just beyond midpoint (Fig. 24). Vein Sc joining costal margin at about 0.9 wing length. Hindwing with about 9 costal and 7 subcostal cross veins. Fork of MP with intercalary. Tarsal claws similar, each with apical hook and opposing ventral flange (Fig. 30). Length of styliger plate of male a little over 0.3 times maximum width. Penis reaching to about middle of basal segment of forcep (Fig. 28). Lobes downturned, each with pointed lateral projection (Figs. 27, 28). Each lobe with series of internal setae (Fig. 29). Female imago with short genital extension on posterior margin of sternum 7. Sternum 9 of female with shallow apical cleft, approximately 3.1-3.7 times as wide as deep (Fig. 31).

Subimago. Wings uniformly grey, costal and subcostal cells of female grey-brown.

Mature nymph. Antennae about twice length of head. Mouthparts as in Figures 37-42. Labrum slightly wider than clypeus, width-length ratio 1.8-1.9. Lateral margins rounded, anterior margin with shallow concavity and 5 broad, squat denticles. Secondary hair fringe set back from anterior margin almost 0.3 of labrum length. Outer margin of mandibles moderately curved, tuft of hairs at about midpoint, and basal to this some finer and shorter hairs. Incisors slender, with 3 apical teeth. Prosthema slender, pointed with subapical tooth at about two-thirds length. Galealacinia of maxilla with row of about 20 subapical ribbon-like pectinate setae, and at inner end of row a sclerotised comb-like seta. Maxillary palp moderately short, middle segment with simple setae only. Terminal segment 0.75-0.80 times length of middle segment. Labium with glossae turned under ventrally, thus laying ventral to the plane of the paraglossae. Labial palp with terminal segment slender, length 2.5-2.8 times maximum width. Inner margin with series of small denticles, as well as some longer hairs. Terminal segment about 0.85 length and 0.80 width of mid-

dle segment. Foreleg (Fig. 33) with numerous sharp spines and scattered long hairs along outer margin of femur. Tibia with long hairs along outer margin, and numerous bipectinate spines along ventral surface. Ventral margin of tarsus with 25-30 simple spines. Tarsal claw smooth (Fig. 34). Posterolateral spines on abdominal segments 6 (small) to 9. Gills double, on abdominal segments 1 to 7. Lamellae similar on all segments, narrowing at about two-thirds length and with single apical filament (Fig. 35). Caudal filaments with basal segments bearing apical whorl of triangular denticles and long setae, segments at midlength with setae only (Fig. 36).

Type species. Bibulmena kadjina sp. nov.

Etymology. From Bibulmen, an aboriginal tribe of south-western Australia.

Remarks. The genus *Bibulmena* can be distinguished from all other leptophlebiid genera by the following combination of characters.

Imago: (1) forewing with ICu, connected to CuA-CuP cross vein (Fig. 23); (2) costal margin of hindwing without projection, but with shallow concavity just beyond midpoint (Fig. 24); (3) apical third of forewing with costal cross veins anastomosed (Fig. 23); (4) claws of a pair alike, with an apical hook and an opposing ventral flange (Fig. 30); (5) sternum 9 of female with an apical cleft (Fig. 31).

Nymph: (1) labrum slightly wider than clypeus; (2) labium with glossae curved under ventrally, ventral to paraglossae (Fig. 41); (3) terminal segment of labial palp with series of small denticles along inner margin (Fig. 42); (4) tarsal claws smooth (Fig. 34); (5) gills double, on abdominal segments 1 to 7, lamellae similar on all segments (Fig. 35).

Comparison of imagos suggests that *Bibulmena* is closely related to *Atalophlebia*, however the morphology of the nymph, in particular the size and shape of the labrum and the form of the labial palps and the incisors of the mandibles, clearly differentiates *Bibulmena* from *Atalophlebia* and also from all other genera in the *Hapsiphlebia* lineage (sensu Pescador and Peters, 1980). Character states used by Pescador and Peters to delineate phyletic lineages in southern hemisphere Leptophlebiidae suggest that *Bibulmena* belongs in the *Atalonella* lineage. While

many nymphal characters are shared with *Atalonella* and related genera, the ventrally curved glossae and the denticles on the inner margin of the terminal segment of the labial palp, as well as many features of adult wing venation, suggest that *Bibulmena* is in fact intermediate between the *Hapsiphlebia* and *Atalonella* lineages. In this regard *Bibulmena* is similar to the South American genera *Penaphlebia* and *Massartella*. However, the nymph is distinguished from these two genera by the smooth tarsal claws and the absence of pectinate setae from the second segment of the maxillary palp.

Bibulmena kadjina sp. nov.

Figures 23-42

Leptophlebiidae species B, Bunn et al. (1986).

Type material. Holotype: Western Australia, North Dandalup River, North Dandalup, S. Bunn, 1 Jun 1984, NMV T-8138 (♂ imago, reared from nymph).

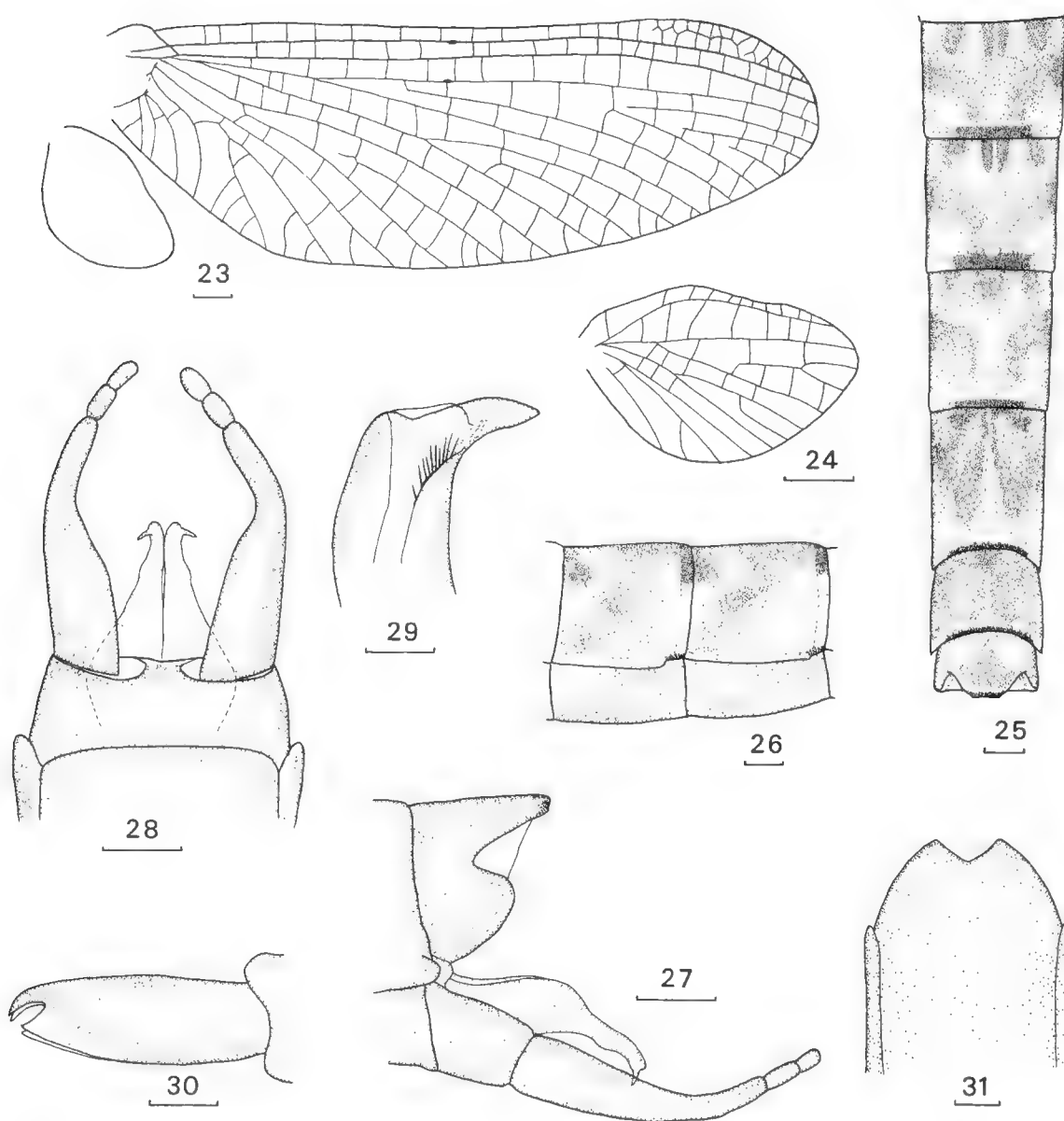
Paratypes: Western Australia, Foster Brook, North Dandalup, S. Bunn, 3 May 1983, NMV T-8160 (♂ imago, reared from nymph, wings genitalia and nymphal parts on slides, figs. 23-30, 34, 36, 37, 42). Foster Brook, North Dandalup, S. Bunn, 8 Sep 1983, NMV T-8139 (♀ imago, fig. 31). Wungong Brook, Jarrahdale, S. Bunn, 2 Dec 1981, NMV T-8159 (♀ nymph, legs and mouthparts on slide, figs. 32, 33, 35, 38-41).

Other material examined. Western Australia. Carbanup River, Marybrook-Vasse road, J. Blyth, 5 Dec 1979 (1 ♂ imago, 1 ♀ imago). North Dandalup River, A. Wells, 4 Sep 1980 (1 nymph). Serpentine River, Jarrahdale, A. Wells, 11 Sep 1980 (1 nymph). North Dandalup River, North Dandalup, S. Bunn, various dates (1 ♂ subimago, 1 ♀ subimago). Wungong Brook, Jarrahdale, S. Bunn, various dates (2 ♀ ♀ imagos, 7 nymphs). Dirk Brook, Jarrahdale, S. Bunn, 26 Jan 1983 (1 ♂ subimago). Augustus River, Collie, S. Bunn, 30 Oct 1983 (1 ♀ imago). Seldom Seen Brook, Jarrahdale, S. Bunn, various dates (11 nymphs). Foster Brook, North Dandalup, S. Bunn, 19 May 1981 (3 nymphs).

Description. Imago. Body length: ♂ 9.2-9.9 mm, ♀ 10.0-11.9 mm.

Forewing: ♂ 9.2-9.6 mm, ♀ 11.4-13.4 mm.

Male imago: Upper portion of eyes orange-brown, lower portion black. Eyes either in contact on meson of head, or separated by distance less than half width of median ocellus. Pronotum pale yellow-brown, black markings along anterior margin and mesal half of posterior margin, longitudinal black lines on midline, halfway between midline and lateral margin, and along lateral margin. Meso- and meta-thorax darker yellow-brown, variously washed with black-

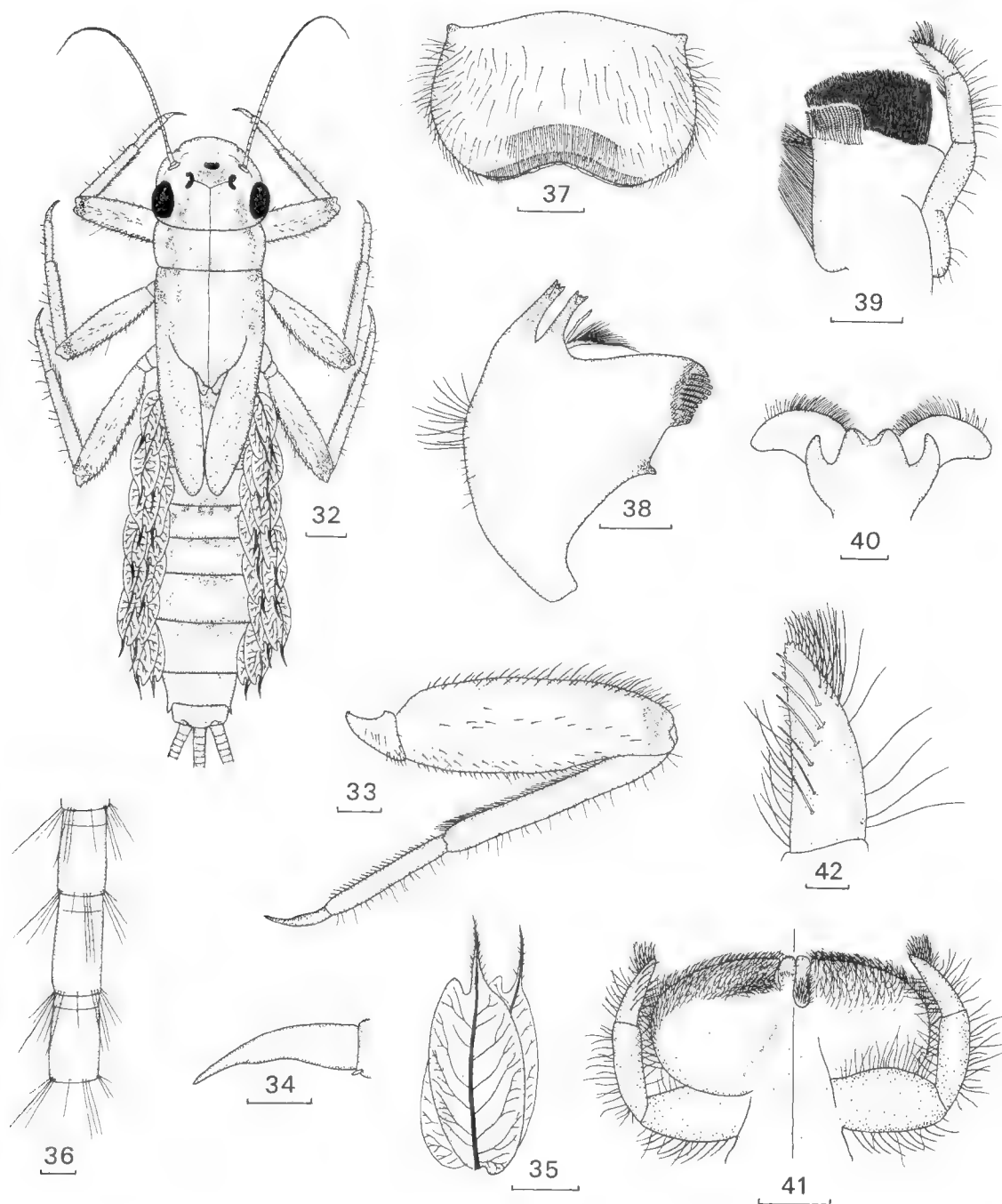


Figures 23-31. *Bibulmena kadjina*, imago. 23, wings, male imago; 24, hindwing enlarged, male imago; 25, abdominal segments 5 to 10, dorsal, male imago; 26, abdominal segments 5 and 6, lateral, male imago; 27, male genitalia, lateral; 28, male genitalia, ventral; 29, apex of penis lobe, dorsal; 30, fore tarsal claws, male imago; 31, ninth sternum, ventral, female imago. Scale lines: 0.04 mm (Figs. 29, 30); 0.2 mm (Figs. 25-28, 31); 0.5 mm (Figs. 23, 24).

brown. Forelegs golden brown, dark brown-black pigmentation at apices of femora and tibiae, less conspicuous dark bands at about two-thirds length of femora. Mid- and hind-legs slightly paler, dark markings at apices of femora only. Ratios of segments in foreleg 0.79: 1.00(2.70 mm): 0.06: 0.44: 0.41: 0.37: 0.15. Forewing hyaline, costal and subcostal cells in apical third of

wing translucent, whitish. Costal cross veins, especially in basal half of wing, washed with thin band of brown. Abdominal terga brown, pattern of darker maculae as in Figures 25 and 26. Sterna brown, no conspicuous markings. Genitalia as in Figures 27 to 29.

Female imago: Colour generally similar to male imago. Eyes separated on meson of head



Figures 32-42. *Bibulmena kadjina*, nymph. 32, whole nymph; 33, foreleg; 34, tarsal claw; 35, gills, abdominal segment four; 36, cercus midlength; 37, labrum; 38, left mandible, dorsal; 39, left maxilla, ventral; 40, hypopharynx; 41, labium, dorsal (left) and ventral (right) aspects; 42, terminal segment of labial palp, dorsal.

Scale lines: 0.05 mm (Figs. 36, 42); 0.1 mm (Fig. 34); 0.2 mm (Figs. 33, 37-41); 0.5 mm (Figs. 32, 35).

by distance 2.5-3.0 times the maximum width of eye. Forewings hyaline, all costal and subcostal cells uniformly shaded pale brown. Costal cross veins highlighted with thin band of brown. Abdomen slightly more reddish-brown than male imago, pattern of darker maculae similar. Genital extension on segment 7 broad, rounded, slightly flattened at apex; extending 0.1-0.2 length of sternum 8.

Nymph: Body length of mature nymph 9.0 to 10.0 mm. General colour yellow-brown, darker brown markings as in Figure 32. Legs yellow-brown, dark brown markings at apices of femora, less conspicuous brown bands at two-thirds length of femora, middle of tibiae, and middle of tarsi. Abdominal sterna yellow-brown, with no obvious markings. Gills narrowing at about two-thirds length, with single apical filament. Inner margin with rounded indentation at level of narrowing. Lateral tracheae well developed.

Etymology. From kadjin, an aboriginal word for a deceased person's spirit or soul.

Acknowledgments

I would like to thank Dr Stuart Bunn, Department of Zoology, University of Western Australia, for supplying the material for the present

study. Dr Arturs Neboiss, Mr David Cartwright, and two anonymous referees kindly commented on the draft manuscript.

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EARLY ORDOVICIAN ORTHIDE BRACHIOPODS FROM THE DIGGER ISLAND FORMATION, WARATAH BAY, VICTORIA

BY J. R. LAURIE

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Abstract

Laurie, J.R., 1987. Early Ordovician orthide brachiopods from the Digger Island formation, Waratah Bay, Victoria. *Mem. Mus. Vict.* 48: 101-106.

Two new species of orthide brachiopod are described from the Digger Island Formation, Waratah Bay. *Finkelburgia lindneri* sp. nov. is the first substantiated record of the genus in Australia, while correlations based on associated trilobite and conodont faunas make *Archaeorthis waratahensis* sp. nov. the oldest known occurrence of the genus.

Introduction

Digger Island is a small stack situated on the western side of Waratah Bay, about 1.5 km south of Walkerville, south Gippsland. It constitutes the type locality of the Digger Island Formation (Lindner, 1953: 80), a sequence of fossiliferous yellow-brown, grey and grey-green shale, mudstone and calcareous shale and thin-bedded limestone.

Lindner (1953: 81) listed Singleton's manuscript names for the formation but no formal descriptions were published; hence the names remain nomina nuda. More recently, Jell (1985) has described in detail the trilobite fauna and summarised the stratigraphy and locality information. As the brachiopods described herein are associated with the main trilobite fauna the reader is referred to this work for detailed stratigraphic information.

The genus *Finkelburgia* is known from rocks of Late Cambrian to Early Ordovician (Late Canadian) age in China, North America and USSR. The genus was recorded from the Early Ordovician of Tasmania by Corbett and Banks (1974) but these specimens were subsequently referred to *Apheorthis* by Laurie (1980). To the author's knowledge, there is thus no previous substantiated record of this genus in Australia.

The genus *Archaeorthis* is found in the USSR, Europe and North America in rocks of Middle to Late Canadian age. Hence, if correlations made by Jell (1985: 55-56) are correct, then the

presence of *Archaeorthis waratahensis* represents the oldest record of the genus thus far. Jell (1985) considered that the Digger Island Formation fauna was best correlated with the *Kainella meridionalis* zone of Argentina, based on the presence in both of the trilobites *Micragnostus hoeki*, *Shumardia erquensis*, *Leioptegium douglasi* and similar species of *Australoharpes*, *Pseudokainella* and *Onychopyge*.

Plectorthacea Schuchert, 1929

Finkelburgiidae Schuchert & Cooper, 1931

Finkelburgia Walcott, 1905

Type species. *Finkelburgia finkelburgi* Walcott, 1905.

***Finkelburgia lindneri* sp. nov.**

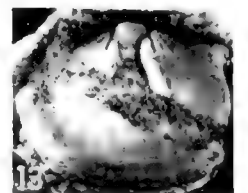
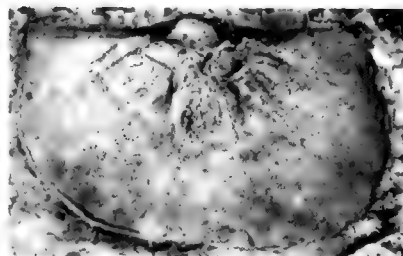
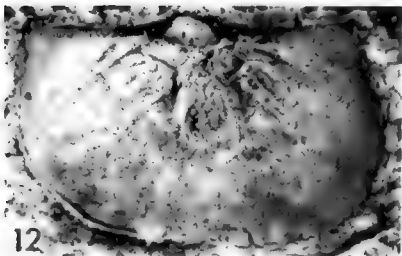
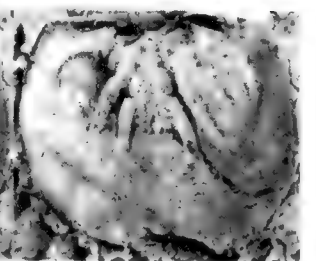
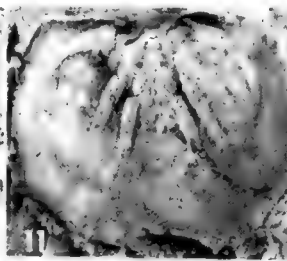
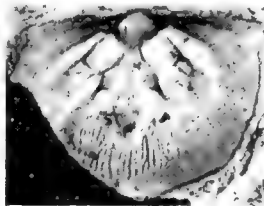
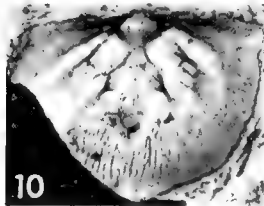
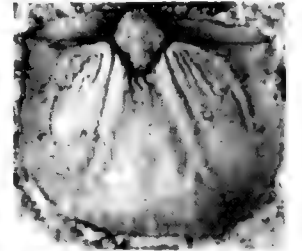
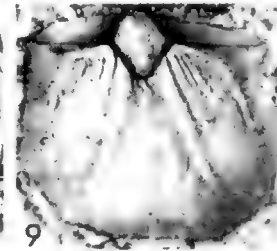
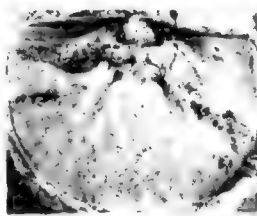
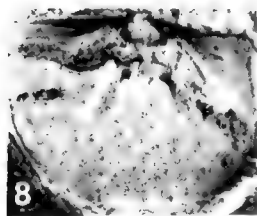
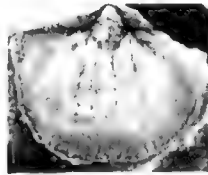
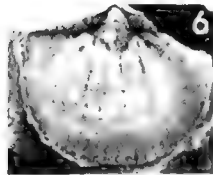
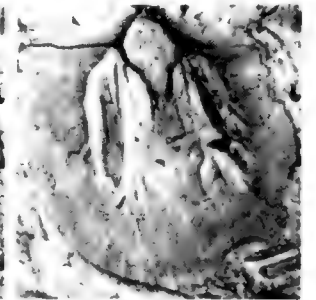
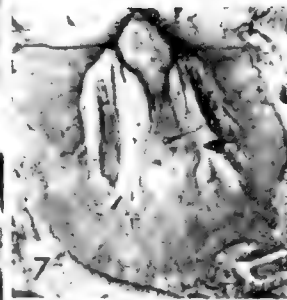
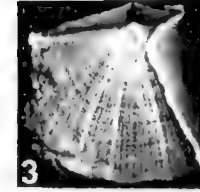
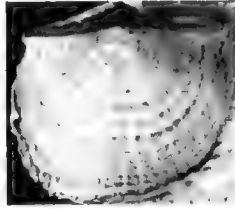
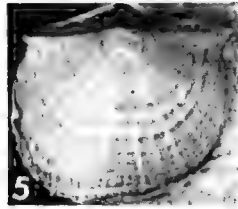
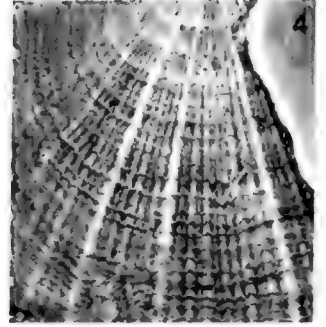
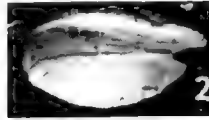
Plate 1, figures 1-13

Material examined. Holotype. NMV P71323, conjoined valves illustrated in Plate 1, figs. 1, 2.

Paratypes. NMV P71324-71332.

Type locality. NMV PL184, from the decalcified mudstone in the middle of the Digger Island Formation, on the northern and western sides of Digger Island. See Jell (1985: 53-54) for further locality information.

Diagnosis. Large *Finkelburgia* commonly with small ears, well-developed lamellose growth lineation intersecting unequally multicostellate ornament, elongate rhombic pseudospondylium and



short, broad, ventral median septum. Cardinal process absent.

Description. Shell large with ventral valve averaging about 90% as long as wide, dorsal valve 77% as long as wide; subequally biconvex, holotype 60% as thick as long, subquadrate to subpentagonal, maximum width being at about midlength, hingeline averaging 90% maximum width. Anterior to hingeline, lateral margins are variably concave, giving rise to similarly developed, though always small, ears. Ventral valve moderately convex, with maximum convexity occurring in anterior half; lateral slopes slightly flattened. Dorsal valve moderately convex with maximum convexity near midlength; in some specimens sulcate posteriorly, in other nonsulcate. External ornament very unequally multicostellate, costellae rounded, clearly developed. At 5.0 mm from beak, about 22 costellae within 5.0 mm, of which 3-5 are very strongly accentuated. An irregularly spaced, finely lamellose growth lineation intersects costellation. Ventral interarea planar to slightly concave, apsacline to orthocline, about 16% as high as wide. Dorsal interarea planar, anacline, about half as high as ventral. Notothyrium fairly narrow.

Teeth large, boss-like, supported by short dental plates which converge ventrally, coalescing with callus to form a narrow, rhombic pseudospondylium occupying about 30% of valve length. Median septum short, broad. Adductor scars large, subtriangular, extending well beyond small, semiovate diductor scars. Vascular system

with two strongly impressed, weakly to moderately divergent vascula media, variable lobate anterior portions of the vascula genitalia (gonocoels) and variably arcuate posterior portions of the vascula genitalia.

Brachiophores short, divergent, bounding semiellipsoidal sockets. Brachiophore plates converge dorsally onto valve floor, bounding short, anteriorly constricted, subtriangular notothyrial platform. Cardinal process absent. Dorsal muscle field variable in shape, averaging about 85% as long as wide and extending about 36% of valve length. Posterior adductors large, subquadrate, located immediately anterior to brachiophores, impressed strongly posteromedially and raised laterally. Anterior scars small, triangular, raised anterolaterally on small platforms which give rise to short anterolaterally directed ridges. Vascular systems with strong, slightly divergent vascula media which branch at a varying length anteriorly. Vascula myaria strong, straight, moderately divergent. Vascula genitalia with a well developed single posterior trunk and with the gonocoels not impressed or as small lobate impressions located anterolaterally of the posterior adductor scars.

Etymology. After A. W. Lindner, who undertook the first detailed study of the geology of the type area.

Remarks. This species is unusual for a representative of this genus in being so large, in lacking any semblance of a cardinal process and in having a very broad ventral median ridge. Such properties clearly differentiate it from most previously known species of the genus. Perhaps the most similar species is proportions and internal structure is *F. roanokensis* Young, 1956. This species is only slightly more than half the size of *F. lindneri*, is lightly more transverse, has a wider notothyrial platform and, although having a radial ornament of similar density, does not have the lamellose concentric ornament characteristic of the new species.

The ventral interior of the new species is also similar in appearance to *F. philipsburgensis* Ulrich & Cooper, 1938 but, apart from being somewhat smaller, the species is too poorly known to allow further comment.

Plate 1. *Finkelburgia lindneri* sp. nov. All 2 × except fig. 4 (5 ×); all stereo pairs except figs. 2-4, 13; all natural moulds except where noted.

Figs. 1, 2. Holotype, latex replica of conjoined valves, dorsal and lateral views respectively, NMV P71323.

Figs. 3, 4. Paratype, latex replica of conjoined valves, dorsal view and detail of ornament respectively, NMV P71324.

Fig. 5. Paratype, latex replica of dorsal valve exterior, NMV P71325.

Fig. 6. Paratype, juvenile ventral interior, NMV P71326.

Fig. 7. Paratype, large ventral interior, NMV P71327.

Fig. 8. Paratype, dorsal interior, NMV P71328.

Fig. 9. Paratype, ventral interior, NMV P71329.

Fig. 10. Paratype, dorsal interior, NMV P71330.

Fig. 11. Paratype, dorsal interior, posterior margin damaged, NMV P71331.

Fig. 12. Paratype, large dorsal interior, NMV P71332.

Fig. 13. Small ventral interior, NMV P71333.

Orthacea Woodward, 1852**?Nanorthidae** Havlicek, 1977

Remarks. Havlicek (1977: 59) erected the Nanorthidae for the genera *Archaeorthis*, *Nanorthis* and *Trondorthis*, but noted their similarity to genera of the Ranorthidae Havlicek, 1949. He differentiated them from members of this family by the "orthoid pattern of the dorsal muscle field, absence of fulcral plates, and [their] fairly narrow notothyrial chamber". In his diagnosis and subsequent discussion, considerable emphasis is placed upon the style of dorsal musculature. Unfortunately this varies considerably within a genus and even within a species. Such variation can be seen by comparing the various published dorsal interiors of *Eodolmanella socialis* (Barande) (Havlicek, 1977, plate 10: compare fig. 14, in which the dividing ridges between anterior and posterior adductors are nearly colinear, with fig. 10 in which these same ridges converge posteriorly at an angle of about 90°).

Furthermore, while the dorsal musculature of species of *Nanorthis* appears to vary little from the transversely divided type noted by Havlicek (1977: 59) in specimens illustrated by Ulrich & Cooper (1938: plate 12, fig. F-22), that of some species of *Archaeorthis* (e.g. *A. glomerata*, Ulrich & Cooper, 1938: plate 13, fig. B-5; *A. elongata*, Ulrich & Cooper, 1938: plate 13, fig. F-28 and *A. biconvexa*, Cooper, 1956: plate 31, fig. B-7) appear to have the ridges separating anterior from posterior scars converging posteriorly at an angle of about 135°, similar to the species described below. Such variations indicate that the classification of *Nanorthis*, *Ranorthis*, *Archaeorthis* and their relatives requires further investigation.

Archaeorthis Schuchert & Cooper, 1931

Type species. *Orthis electra* Billings, 1865.

Archaeorthis waratahensis sp. nov.

Plate 2, figures 1-14

Material examined. Holotype. NMV P71338, ventral interior illustrated in Plate 2, fig. 5.

Paratypes. NMV P71334-7, P71339-47.

Type locality. NMV PL184, from the decalcified mudstone in the middle of the Digger Island Formation, on the northern and western sides of Digger Island. See Jell (1985: 53-45) for detailed locality information.

Diagnosis. Moderately sized, ventribiconvex, sulcate *Archaeorthis* with fine fascicostellate ornament, a short, broad ventral muscle field and a weakly developed premuscle callosity which only appears late in ontogeny.

Description. Shell up to 11.3 mm wide with ventral valve averaging 78% as long as wide, dorsal valve 73% as long as wide. Shell ventribiconvex, subquadrate, maximum width being at about midlength. Hingeline averages 86% of maximum width with cardinal extremities obtuse to narrowly rounded. Ventral valve moderately convex with maximum convexity occurring in posterior half. In anterior view, lateral slopes are strongly flattened, with midportion of valve narrowly arched, carinate in some smaller specimens. Dorsal valve weakly convex with maximum convexity in posterior half, usually with well developed, though shallow V-shaped sulcus. External ornament fascicostellate, costellae rounded with about 18 costellae occurring within 5.0 mm at 5.0 mm from beak. Ventral interarea planar, apsacline, about 17% as high as wide, with open delthyrium. A single specimen (plate 2, fig. 3) exhibits what appears to be apical resorption in the ventral valve. Dorsal interarea planar, anacline, less than half as high as ventral; notothyrium broad, open.

Teeth plate-like, supported by short dental plates laterally bounding short subtriangular muscle field which extends anteriorly about 25% of valve length and is about as wide as long. Adductor scar is broad, subtriangular, raised anteriorly with a convex anterior margin, extending beyond narrowly triangular diductors. Anterior to adductors in larger specimens is a low, short, indistinct, premuscle callosity (plate 2, figs. 5, 8). Vascula media long, narrow, divergent (plate 2, figs. 6-8).

Brachiphores short and widely divergent, bounding semiellipsoidal sockets which are underlain by variably developed socket pads. Notothyrial cavity deep, platform low, variable

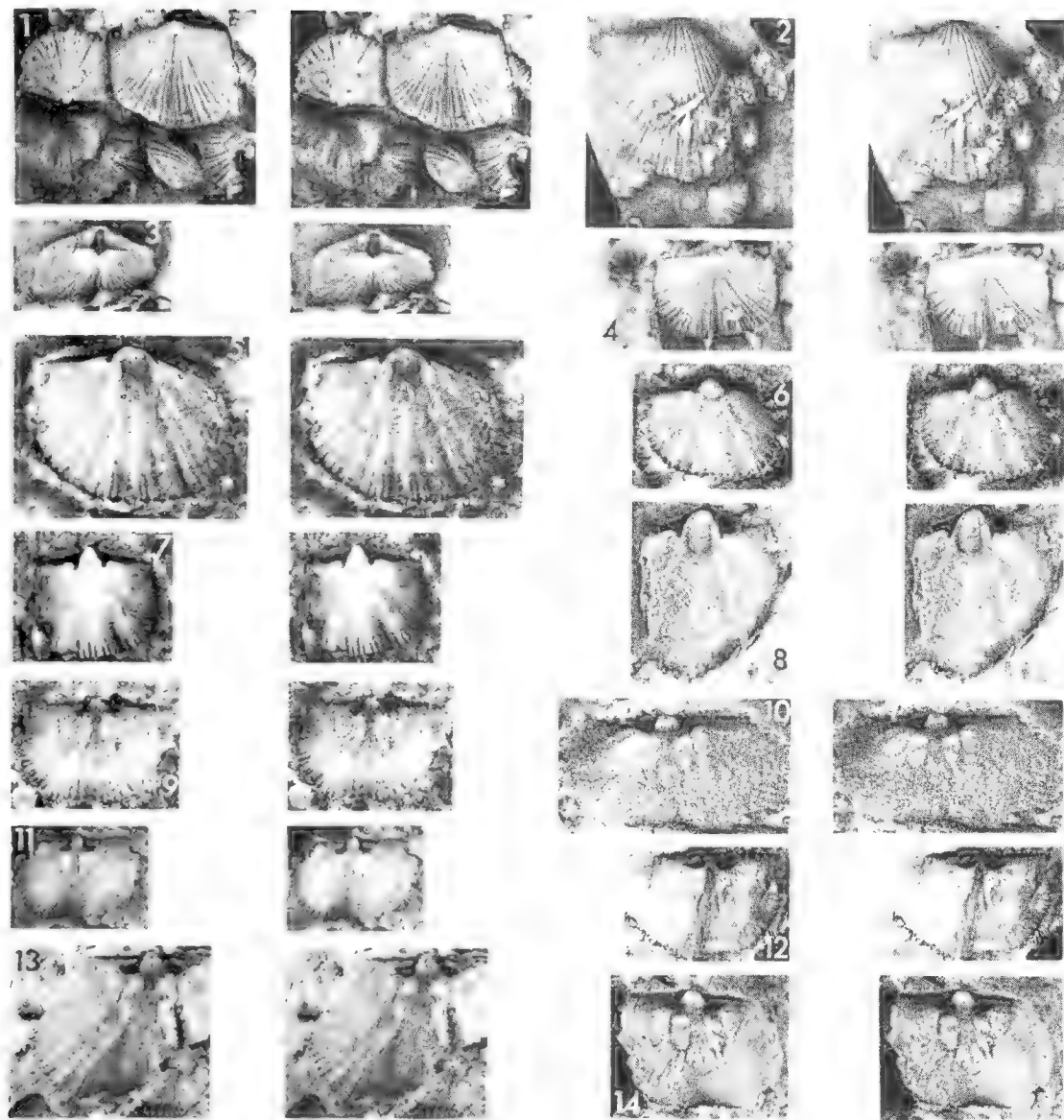


Plate 2. *Archaeorthis waratahensis* sp. nov. All $\times 3$; all stereo pairs; all natural moulds except where noted.

Fig. 1. Paratype, latex replica of adjacent (L to R) ventral and dorsal valve exteriors, NMV P71334.

Fig. 2. Paratype, latex replica of large ventral exterior, NMV P71335.

Fig. 3. Paratype, postero-dorsal view of latex replica of conjoined valves, NMV P71336.

Fig. 4. Paratype, latex replica of dorsal exterior, NMV P71337.

Fig. 5. Holotype, large distorted ventral interior, NMV P71338.

Fig. 6. Paratype, small distorted ventral interior, NMV P71339.

Fig. 7. Paratype, small ventral interior, NMV P71340.

Fig. 8. Paratype, large distorted ventral interior, NMV P71341.

Fig. 9. Paratype, dorsal interior, NMV P71342.

Fig. 10. Paratype, large distorted dorsal interior, NMV P71343.

Fig. 11. Paratype, small dorsal interior, NMV P71344.

Fig. 12. Paratype, dorsal interior, NMV P71345.

Fig. 13. Paratype, large broken dorsal interior, NMV P71346.

Fig. 14. Paratype, dorsal interior, NMV P71347.

in shape but usually broadly triangular with anterior constriction. Cardinal process absent. Dorsal muscle field usually well impressed, about 85% as wide as long, extending anteriorly about 47% of valve length. Posterior adductors subrhomboidal. Located immediately anterior to brachioophores. Anterior scars small, subtriangular, separated from posterior scars by narrow ridges which converge posteriorly at about 135°. Vascular system not well impressed, but where visible in some specimens, pairs of slightly divergent vascula media and strongly divergent vascula myaria can be observed as well as pair of canals arising near the brachioophore bases and extending laterally nearly parallel to the hinge (plate 2, figs. 12, 14).

Etymology. Pertaining to the locality in Waratah Bay.

Remarks. This species is about average size for a representative of *Archaeorthis* but is distinctive in having a fine fascicostellate ornament and a poorly developed premuscle callosity which is only evident late in ontogeny. It is most similar to *A. glomerata* Ulrich & Cooper, 1936 in this respect but the ornament of the latter is somewhat coarser (13 costellae per 5 mm whereas *A. waratahensis* has 18). *A. glomerata* also differs in having a relatively longer and much narrower ventral muscle field (about 60% as wide as long, whereas that of *A. waratahensis* is equidimensional).

Acknowledgements

I thank P. A. Jell (Museum of Victoria) for giving me the opportunity to work on these specimens, and Des Strusz and John Shergold (Bureau of Mineral Resources) for helpful discussions during the preparation of this paper. All specimens referred to are housed in the collection of the Museum of Victoria (NMV). This paper is published with the permission of the Director, Bureau of Mineral Resources.

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NEW AND LITTLE-KNOWN SPECIES OF THE WATER MITE GENERA
TARTAROTHYAS, *PSEUDOHYDRYPHANTES* AND *CYCLOHYDRYPHANTES*
FROM AUSTRALIA (CHELICERATA: ACTINEDIDA: HYDRYPHANTIDAE)

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71 Victoria Crescent, Abbotsford, Victoria, 3067

Abstract

Harvey, M. S., 1987. New and little-known species of the water mite genera *Tartarothyas*, *Pseudohydrhypantes* and *Cyclohydrhypantes* from Australia (Chelicerata: Actinedida: Hydrhypantidae). *Mem. Mus. Vict.* 48: 107-122.

The following new water mite species are described from Australia: *Tartarothyas boultoni* (from Victoria), *Pseudohydrhypantes doegi* (Western Australia), *P. vepres* (Victoria, New South Wales), *P. occabus* (Victoria), *P. cooki* (Victoria) and *Cyclohydrhypantes mutarnee* (Queensland). The first is the only member of the genus *Tartarothyas* to be recorded from outside the Holarctic region. *Pseudohydrhypantes amatus* Cook and *P. stylatus* Cook are recorded from Victoria for the first time.

Introduction

The Hydrhypantidae is currently represented in Australia by 10 described species in five genera: *Hydrhypantes* Koch, *Diplodontus* Duges, *Cyclohydrhypantes* Lundblad, *Pseudohydrhypantes* Viets and *Wandesia* Schechtel (Cook, 1986). Recent field work has uncovered several previously undescribed species in the genera *Tartarothyas*, *Pseudohydrhypantes* and *Cyclohydrhypantes*, as well as representatives of two species of *Pseudohydrhypantes* from Victoria previously known only from Tasmania. These species are treated below.

Unless otherwise stated, the material was collected by the Museum of Victoria's Department of Environmental Records (previously Biological Survey). Specimens are lodged in the Museum of Victoria, Melbourne (NMV), the Australian Museum, Sydney (AM), the Australian National Insect Collection, Canberra (ANIC), the Western Australian Museum, Perth (WAM), the Field Museum of Natural History, Chicago (FMNH) and the Canadian National Collection, Ottawa (CNC). Many specimens are mounted on microscope slides in glycerine jelly. Measurements were taken to the nearest 5 μm ; those that could not be measured are shown as "?". Dimensions are usually given as length divided by width. Mor-

phological terminology follows Cook (1974) except for the terminology of the leg segments which follows Smith (1976), and for the terminology of the glandularia which is as follows. Each of the species described below possesses six pairs of dorsoglandularia (dg), five pairs of lateroglandularia (lg) and five pairs of ventroglandularia (vg), which are numbered sequentially (e.g. Figs. 1-2). This is also true for many other hydrhypantids. Under previous systems, the first two pairs of ventroglandularia were termed epimeroglandularia (e.g. Lundblad, 1927; Cook, 1974) or coxoglandularia (e.g. Mitchell, 1953) due to their association with the coxal groups. They are here referred to the ventroglandularia system simply for ease of reference.

Hydrhypantidae

***Tartarothyas* Viets**

Tartarothyas Viets, 1934: 133.—Cook, 1974: 87. (Type species *Tartarothyas micrommata* Viets, 1934, by original designation.)

Vietsthyas Motas, Tanasachi & Orghidan, 1957: 104. (Type species *Vietsthyas fonticola* Motas, Tanasachi & Orghidan, 1957, by original designation. Synonymized by Motas & Tanasachi, 1962.)

Diagnosis. Legs without swimming hairs; dorsal

plates absent; peripheral glandularia platelets absent; lateral eyes reduced and not on ocular tubercles; median eye absent; body not elongate.

Remarks. The genus *Tartarothyas* currently contains three named species from Europe: *T. micrommata* Viets, *T. romanica* Husianatschi and *T. fonticola* (Motas, Tanasachi & Orghidan). A single deutonymph has been collected in Michigan, USA (Cook, 1974) but adults have not been taken and the species is unnamed (D.R. Cook, pers. comm.). Dr I.M. Smith (pers. comm.) reports that two undescribed species are represented in the CNC collections from Canada and USA.

Tartarothyas boultoni sp. nov.

Figures 1-9

Type material. Holotype: Victoria, Werribee River, 11.5 km NNW of Ballan, M.S. Harvey, 20 Jun 1985, NMV K231(♀, slide).

Paratypes: Same data as holotype, NMV K232-237(6 deutonymphs, slides and fluid). Same data except A.J. Boulton, 24 May 1983, NMV K238-244(2♂♂, 4♀♀, 1 deutonymph, slides). Same data except 7 Jun 1983, NMV K245-251(2♂♂, 4♀♀, 1 deutonymph, slides). Same data except 22 Jun 1983, NMV K253-295(9♂♂, 20♀♀, 14 deutonymphs, slides and fluid); FMNH(2♂♂, 2♀♀, 2 deutonymphs, fluid); CNC(2♂♂, 2♀♀, 2 deutonymphs, fluid). Same data except 11 Oct 1983 (NMV K296-297, 2♀♀, slides). Same data except 25 Nov 1982 (NMV K298, 1 deutonymph, fluid).

Diagnosis. dg3 on about same level as postocularia.

Description. Adults. Integument papillate. Two pairs of lenticular lateral eyes present (Fig. 1). Six pairs of dorsoglandularia, five pairs of lateroglandularia and five pairs of ventroglandularia present, without associated sclerites; dg3 on same level or slightly anterior to postocularia (Figs. 1-2). Genital flaps with 7-10 (male), 9-13 (female) pairs of setae (Figs. 3-4); three pairs of acetabula (Figs. 3-4), first pair longest, third pair ovoid and on stalks. Ejaculatory complex not studied. Cheliceral claw with 15-19 short teeth; cheliceral lamella nearly as long as claw, not serrate (Fig. 8). Palp (Fig. 7): tibia with a thickened, sub-distal seta on medial surface and with distal extension; tarsus with three terminal processes. Capitulum with two stout setae on anterior margin. Coxae I-II with 1-2 stout setae on distal ends

(Fig. 2). Legs (Figs. 5-6) without swimming setae; pedal claws completely smooth. Anus without associated sclerite (Fig. 2).

Dimensions (µm): male (female): body 720-760/520-610 (830-1010/540-670); capitulum length 205 (220-270), genital field 180-190/145-160 (210-250/160-205); palp: trochanter 45 (50-55), femur 80-90 (85-100), genu 55-65 (55-65), tibia 100-135 (135-155), tarsus 40-50 (50-60); leg I: trochanter 65-100 (75-80), basifemur 70-120 (80-100), telofemur 85-95 (95-115), genu 115-135 (120-150), tibia 140-160 (150-185), tarsus 140-165/40-60 (130-170/55-65); leg IV: trochanter 120 (110-150), basifemur 95-110 (105-145), telofemur 115-130 (130-160), genu 165-190 (180-225), tibia 200-225 (215-270), tarsus 155-175/40-45 (165-210/45-55).

Deutonymphs. Two pairs of lenticular lateral eyes present. Glandularia as in adults except that vg3 lacks a glandularium and is reduced to a single seta. Genital flaps small and with 3-4 pairs of setae (Fig. 9); two pairs of acetabula, anterior pair ovoid, posterior pair circular and on stalks (Fig. 9). Cheliceral claw with 9-10 short teeth. Palp and legs as in adults. Coxa I with one stout seta on distal end.

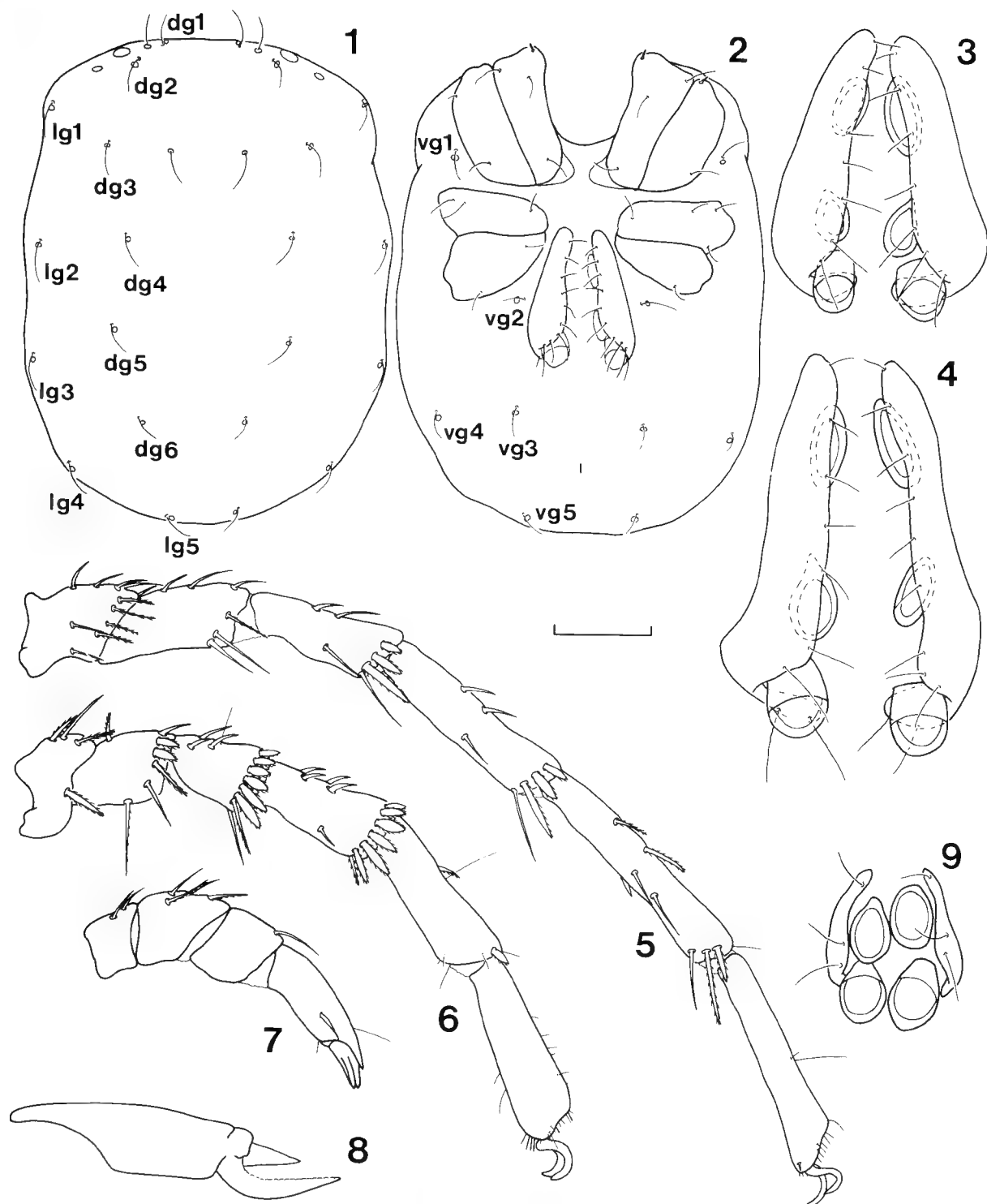
Etymology. This species is named for Andrew Boulton, collector of most of the known specimens.

Remarks. *Tartarothyas boultoni* differs from the three described European species by the position of dg3 which is on about the same level as the postocularia, whereas in the three other species it is situated well posterior to the postocularia. I have been able to compare this species with the female of *T. romanica* from Sweden referred to by Lundblad (1962) which is lodged in the Swedish Museum of Natural History (prep. 5343) and they are clearly congeneric. The collection site was described by Boulton and Smith (1985).

Pseudohydryphantes Viets

Pseudohydryphantes Viets, 1907: 142.-Viets, 1936: 144.-Cook, 1974: 88. (Type species *Pseudohydryphantes parvulus* Viets, 1907, by monotypy.)

Diagnosis. Swimming hairs present on legs III, IV and occasionally on leg II; dorsal plates absent; peripheral glandularia platelets absent;



Figures 1-9. *Tartarothyas boultoni* sp. nov. Figs. 1-2, paratype female, K263. Fig. 3, paratype male, K245. Figs. 4-8, holotype female. Fig. 9, paratype deutonymph, K232. Fig. 1 Dorsal view. Fig. 2 Ventral view. Fig. 3 Genital field. Fig. 4 Genital field. Fig. 5 Left leg IV. Fig. 6 Left leg I. Fig. 7 Left palp. Fig. 8 Left chelicera. Fig. 9. Genital field.
Scale line = 180 μ m (Figs. 1-2), 70 μ m (Figs. 3-4), 100 μ m (Figs. 5-8), 50 μ m (Fig. 9).

Key to Australasian species of *Pseudohydryphantes*

1. Glandularia completely surrounded by sclerotized rings (Fig. 36)2
 - Glandularia only partially surrounded by sclerotized rings thus forming crescents (e.g. Fig. 13)3
2. Tarsal claws with ventral serrations; chelicerae not elongate; capitulum without extension.....*P. bebelus*
 - Tarsal claws without ventral serrations (Figs. 40-41); chelicerae elongate (Fig. 43); capitulum with long, down-turned anterior extension to accomodate chelicerae*P. occabus*
3. Tarsal claws with large, ventral serrations (Fig. 31)*P. vepres*
 - Tarsal claws ventrally smooth or with one small ventral tooth4
4. Tarsal claws with one small ventral tooth (Figs. 21-22).....*P. doegi*
 - Tarsal claws without ventral teeth5
5. Chelicerae elongate; capitulum with long, down-turned anterior extension to accomodate chelicerae*P. stylatus*
 - Chelicerae not elongate; capitulum without extension6
6. Setae on genital flaps very short (Fig. 12)*P. amatus*
 - Setae on genital flaps long (Fig. 46)7
7. Sclerites associated with glandularia small, not crescent shaped; pedal tarsi, especially of leg I, noticeably thickened*P. crassipes*
 - Sclerites associated with glandularia crescent shaped (Figs. 44-45); pedal tarsi not noticeably thickened (Fig. 48)*P. cooki*

lateral eyes on ocular tubercles; median eye present; body not elongate.

Remarks. The genus *Pseudohydryphantes* currently contains seven described species: *P. parvulus* Viets (Europe), *P. latipalpus* Marshall (Alaska), *P. orbicularis* Marshall (Canada), *P. bebelus* Cook (New Zealand), *P. amatus* Cook (Tasmania), *P. crassipes* Cook (Tasmania) and *P. stylatus* Cook (Tasmania). The species described below are the first to be recorded from mainland Australia, and interestingly, two appear to be more similar to the sole New Zealand species than to the other Australian species. The new species can be compared only with the four austral species, because of the poor published descriptions of the three Holarctic species, especially *P. latipalpus* and *P. orbicularis*.

***Pseudohydryphantes amatus* Cook**

Figures 10-12

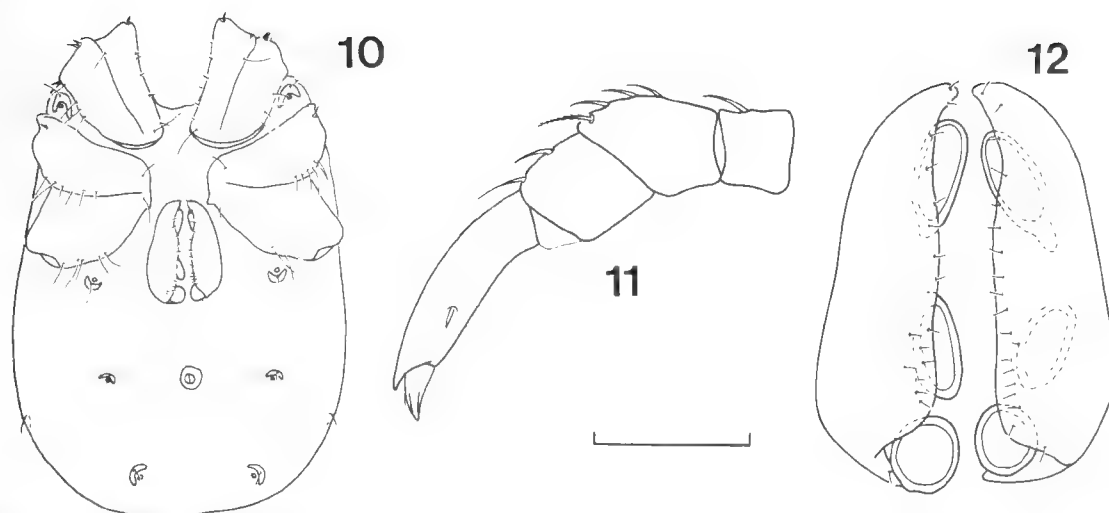
Pseudohydryphantes amatus Cook, 1986: 17-18, figs. 66-72.

Material examined. Victoria, Bendoc River, Bendoc, D.R. Cook, M.S. Harvey and A.J. Boulton, 6 Apr 1985, NMV (1 ♂, slide).

Description. Male: Median eye pigmented and

situated anterior to postocularia platelets; postocularia on same level as dg3 but posterior to median eye. Six pairs of dorsoglandularia, five pairs of lateroglandularia and five pairs of ventroglandularia present; sclerites associated with glandularia crescent shaped (Fig. 10); vg3 on same level as anus (Fig. 10). Genital flaps narrow, mesal edge with a row of short setae (Fig. 12); three pairs of acetabula (Fig. 12), first pair longest; first two pairs elliptical; third pair ovoid. Ejaculatory complex with proximal arm nearly as long as proximal chamber. Chelicera of normal proportions, cheliceral claw with 10 short teeth; cheliceral lamella nearly as long as claw, serrate. Palp (Fig. 11): tibia with a thickened, subdistal seta on medial surface and with distal extension. Coxae I-III with 1-2 (usually 1) stout setae on distal ends (Fig. 10). Legs III and IV with swimming setae arranged as follows: leg III: telofemur 2, genu 9, tibia 9; leg IV: telofemur 2, genu 9, tibia 8. Pedal claws without serrations, but each with a dorsal tooth. Anus surrounded by sclerotized ring (Fig. 10).

Dimensions (µm): body 810/590; capitulum length 225; chelicera length 295; genital field 170/125; palp: trochanter 50, femur 80, genu 60,



Figures 10-12. *Pseudohydryphantes amatus* Cook, male from Bendoc, Victoria. Fig. 10 Ventral view. Fig. 11 Right palp. Fig. 12 Genital field. Scale line = 250 μ m (Fig. 10), 100 μ m (Fig. 11), 70 μ m (Fig. 12).

tibia 145, tarsus 40; leg I: trochanter 65, basifemur 105, telofemur 80, genu 110, tibia 130, tarsus 150/50; leg IV: trochanter 115, basifemur 85, telofemur 115, genu 150, tibia 185, tarsus 170/40.

Remarks. This species was originally described from two females collected in Tasmania and is easily distinguished from other members of the genus by the short setae on the genital flaps.

Pseudohydryphantes stylatus Cook

Figures 13-17

Pseudohydryphantes stylatus Cook, 1986: 17, figs. 59-65.

Material examined. Victoria, Sandy Waterhole Creek, Genoa, 37°23'S 149°26'E, 24 Feb 1976 (NMV, 1 σ , 1 ϕ , slides).

Supplementary description. Postocularia situated posterior to dg3 and median eye (Fig. 13). Six pairs of dorsoglandularia, five pairs of lateroglandularia and five pairs of ventroglandularia present; sclerites associated with glandularia crescent shaped (Figs. 13, 14, 16); vg3 of males closer to genital field than to anus (Fig. 16), vg3 of females slightly anterior to anus (Fig. 14). Genital flaps of female narrow, with a mesal row of long setae, especially on posterior portion (Fig. 15); three pairs of acetabula, females with first two pairs elongate and third pair ovoid (Fig. 15). Chelicera elongate. Palp (Fig. 17): tibia of

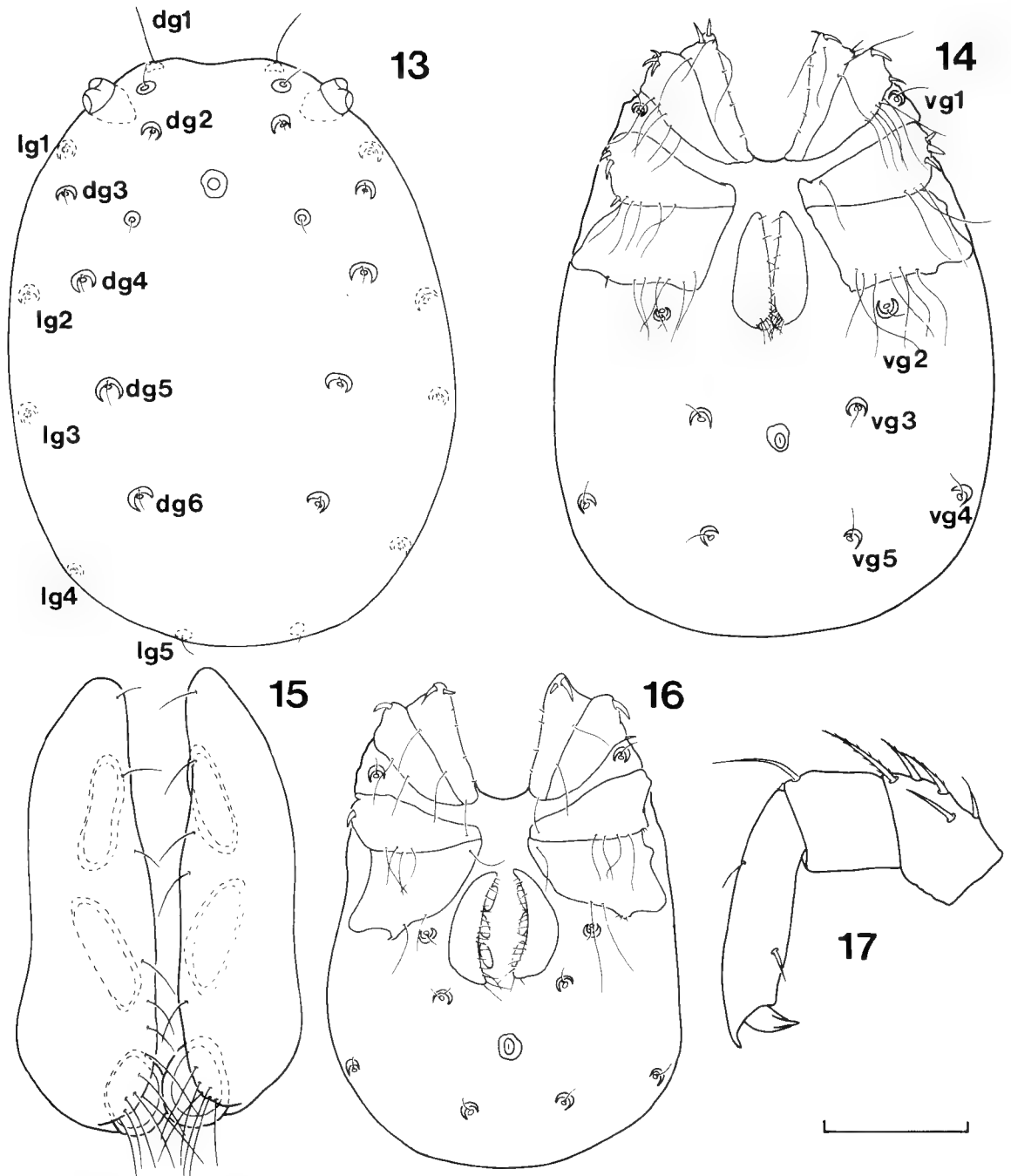
female with a thickened sub-distal seta on medial surface and with distal extension. Coxae I-III with 1-3 stout setae on distal ends (Figs. 13, 16). Legs III and IV with swimming setae arranged as follows: leg III: male: telofemur 2, genu ?, tibia 12; female: telofemur 0, genu 10, tibia 12; leg IV: male: telofemur 2, genu 15, tibia 14; female: telofemur 2, genu 13, tibia 15. Pedal claws without serrations, but with a dorsal tooth. Anus surrounded by sclerotized ring.

Dimensions (μ m): male (female): body 970/640 (1080/850); capitulum 320 (270); chelicera length ? (490); genital field 215/210 (210/145); palp: trochanter ? (?), femur 110 (105), genu 80 (80), tibia 200 (190), tarsus 45 (40); leg I: trochanter 70 (?), basifemur 100 (90), telofemur 105 (100), genu 140 (140), tibia 170 (180), tarsus 190/65 (200/60); leg IV: trochanter 125 (140), basifemur 145 (120), telofemur 180 (185), genu 255 (280), tibia 275 (295), tarsus 265/55 (230/50).

Remarks. *Pseudohydryphantes stylatus* was originally described from a single male collected in north-western Tasmania.

This species exhibits three very interesting forms of sexual dimorphism previously unrecorded in the genus and that are very rare in the family.

(1) Males possess a very small, sub-basal thickened seta on the palpal tibia (Cook, 1986, fig.



Figures 13-17. *Pseudohydryphantes stylatus* Cook, from Genoa, Victoria. Figs. 13-15, 17, female. Fig. 16, male. Fig. 13 Dorsal view. Fig. 14 Ventral view. Fig. 15 Genital field. Fig. 16 Ventral view. Fig. 17 Right palp, without trochanter. Scale line = 250 μm (Figs. 13-14, 16), 70 μm (Fig. 15), 100 μm (Fig. 17).

63), whereas the females possess a larger, subdistal seta (Fig. 17). This is somewhat reminiscent of *Cowichania interstitialis* Smith in which the males possess a large seta and the females

possess a reduced seta (Smith, 1983).

(2) vg3 of the males is situated very close to the genital field (Fig. 17), whereas in the females it is situated near the anus (Fig. 14), as in all other

species of the genus, with the exception of *P. occabus*.

(3) dg3 of the males is situated close to the postocularia making dg4 the most laterally placed dorsoglandularium (Cook, 1986, fig. 61), whereas in the female, dg3 is laterally displaced and is situated as laterally as dg4 (Fig. 13).

***Pseudohydryphantes doegi* sp. nov.**

Figures 18-25

Type material. Holotype: Western Australia, Pooginup Swamp, 34°33'S, 116°44'E, M.S. Harvey and T.J. Doeg, 4 Sep 1985, NMV K299(♂, slide).

Paratypes: Same data as holotype, NMV K300-304(1 ♂, 4 ♀♀, slides and fluid); WAM 85/1493-1494(2 ♀♀, slides).

Diagnosis. Pedal claws with single ventral tooth; sclerites associated with glandularia crescent shaped; chelicerae not elongate.

Description. Integument papillate. Lateral eyes on ocular tubercles; anterior-lateral eye about same size as posterior-lateral eye; postocularia posterior to median eye and to dg3 (Fig. 18). Six pairs of dorsoglandularia, five pairs of lateroglandularia and five pairs of ventroglandularia present (Figs. 18-19); sclerites associated with glandularia crescent shaped (Figs. 18-19), but the left vg3 of the male paratype has an anomolous, complete, somewhat reduced, ring; vg3 slightly anterior to anus and vg4, but not approaching genital flaps (Fig. 19). Genital flaps of male wider than those of female, mesal edge with a row of long setae, especially on posterior edge in male (Figs. 20-21); three pairs of acetabula (Figs. 20-21), second pair longest; first two pairs elliptical; third pair ovoid. Ejaculatory complex with proximal arm nearly as long as proximal chamber. Chelicera (Fig. 25) of normal proportions, cheliceral claw curved, with 11-13 short teeth; cheliceral lamella about half as long as claw, serrate. Capitulum without long, down-turned anterior extension. Palp (Fig. 24): tibia with a thickened sub-distal seta on medial surface and with distal extension. Coxae I-III with 1-2 (usually 1) stout setae on distal ends (Fig. 19). Legs II, III and IV with swimming setae arranged as follows: leg II: genu 0-1; leg III: telofemur 1, genu 9-10, tibia 9-11; leg IV: telofemur 3, genu 9-13, tibia 9-11. Pedal claws without serrations, but with a dorsal and a ventral tooth (Figs. 22-23). Anus surrounded by

sclerotized ring (Fig. 19).

Dimensions (μm): male (female): body 790-800/640-660 (840-1120/690-800); capitulum length 210 (225-240); chelicera length ? (325-360); genital field 140-145/130-135 (175-190/155-170); palp: trochanter 50-55 (50-55), femur 85-90 (85-100), genu 50-55 (55-65), tibia 135 (145-160), tarsus 40 (45); leg I: trochanter 60-65 (60-65), basifemur 50-55 (55-65), telofemur 75 (80-100), genu 110 (125-140), tibia 120-125 (140-155), tarsus 145-150/45-50 (155-170/50-55); leg IV: trochanter 120 (125-145), basifemur 90 (100-110), telofemur 125 (140-165), genu 190 (215-250), tibia 200-205 (230-270), tarsus 175/40 (190-220/45).

Etymology. This species is named for Tim Doeg who assisted in the collection of the specimens.

Remarks. *Pseudohydryphantes doegi* was collected in a swamp amongst reeds and other plant material and is the first Australian species to be taken from standing water. A swimming hair is usually present on the genu of leg II of this species, allying it with the North American species mentioned by Cook (1986: 16). As the only described species from the Nearctic region are the lake-dwelling species *P. latipalpus* and *P. orbicularis* (Marshall, 1924, 1929, respectively), it may be a feature restricted to lentic forms.

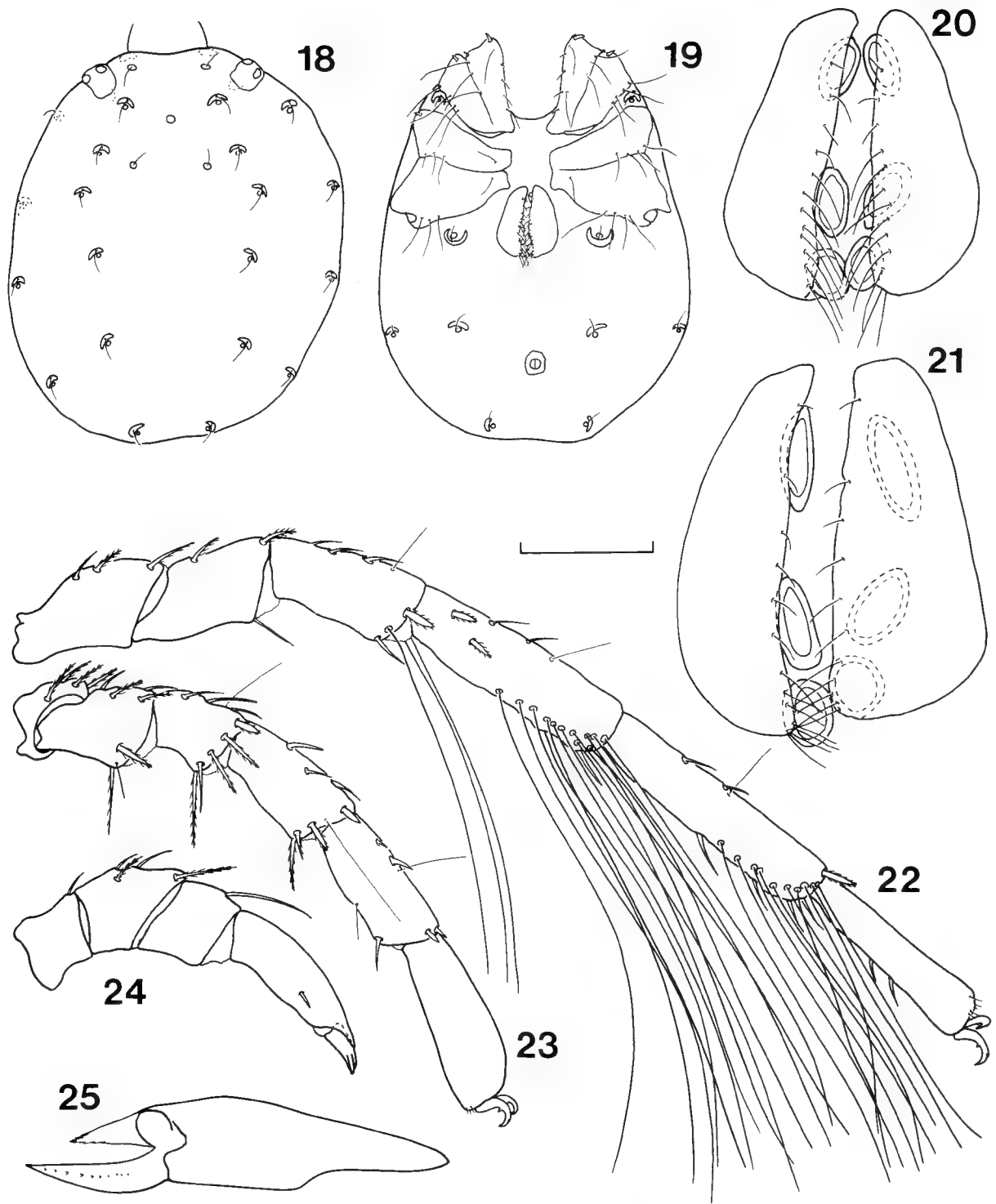
***Pseudohydryphantes vepres* sp. nov.**

Figures 26-35

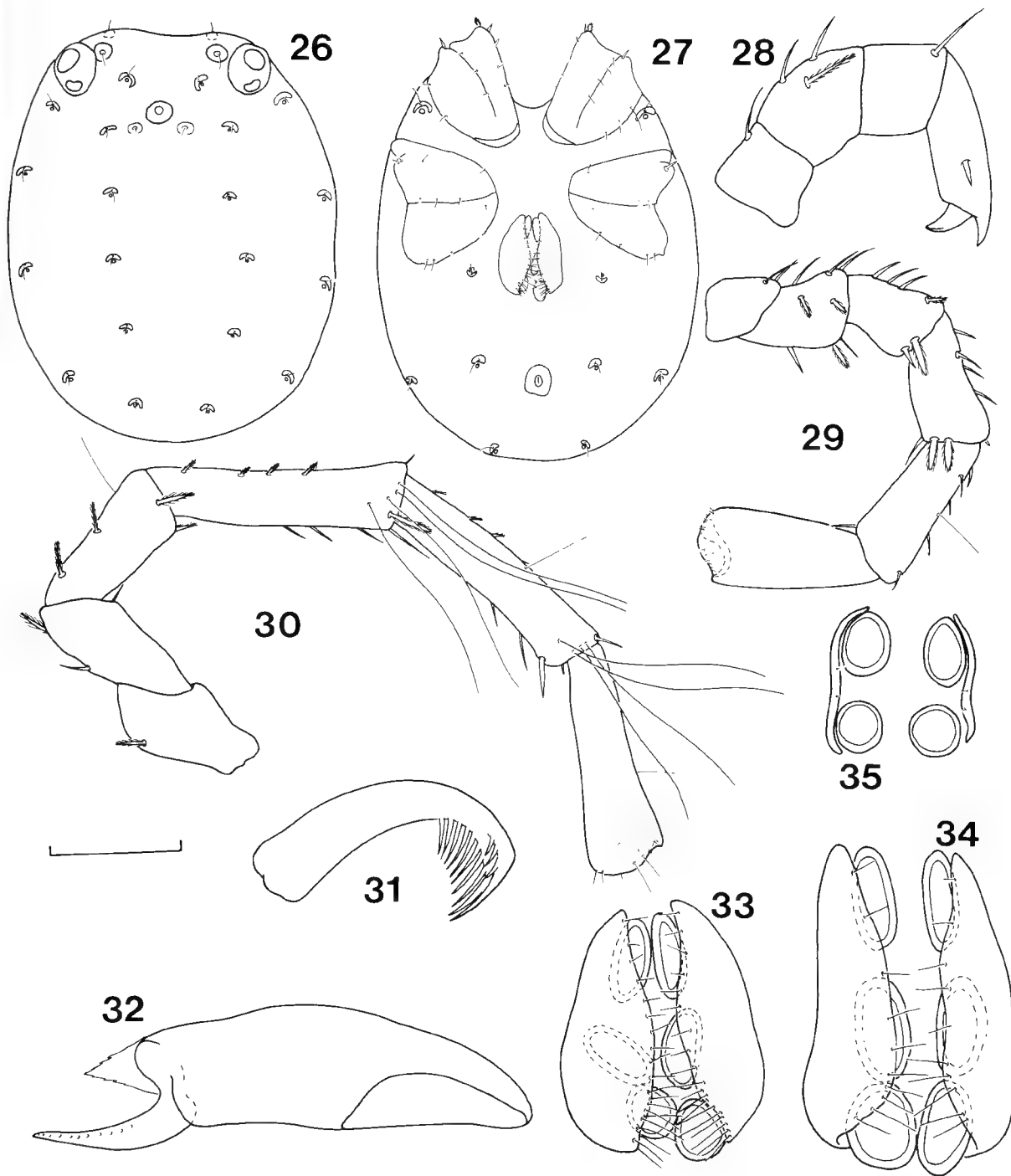
Type material. Holotype: Victoria, Brunton's Bridge, Thomson River (stn T21A), 23 Nov 1979, NMV K227(♂, slide).

Paratypes: Victoria. Same data as holotype, NMV K228(1 ♀, slide). Same data except 14 Mar 1979, NMV K305(1 ♂, fluid). Thomson River, 6 km E of Erica (stn T21), 27 Nov 1976, NMV K306(1 ♂, slide). Junction of Thomson and Aberfeldy Rivers, Fingerboard Spur Track (stn T20), 4 May 1977, NMV K307(1 ♀, fluid).

New South Wales. Thredbo River, 2 km upstream of Thredbo sewage works, Kosciusko National Park, M.E. McKaige, 24 Feb 1982, NMV K308(1 ♂, fluid). Same data except 22 Sep 1982, NMV K309-312(1 ♂, 3 ♀♀, slides and fluid). Same data except 27 Nov 1982, NMV K313(1 deutonymph, fluid). Same data except 29 Jan 1983, NMV K314-319(4 ♂♂, 1 ♀♀, 1 deutonymph, fluid). Same data except 0.3 km upstream of Thredbo sewage works, 28 Jan 1983, NMV K320(1 ♀, fluid). Same data except 27 Nov 1982, NMV K321(1 deutonymph, slide). Same data except at Thredbo sewage works, NMV K322-324(2 ♂♂, 1 ♀, fluid); FMNH(1 ♂, 1 ♀, fluid); CNC(1 ♂, 1 ♀, slides). Same data except 5 km downstream of Thredbo sewage works, 24 Sep 1982, NMV



Figures 18-25. *Pseudohydryphantes doegi* sp. nov. Figs. 18-20, 22-24, holotype male. Fig. 21, paratype female, K302. Fig. 22, paratype female, K301. Fig. 18 Dorsal view. Fig. 19 Ventral view. Fig. 20 Genital field. Fig. 21 Genital field. Fig. 22 Right leg IV. Fig. 23 Right leg I. Fig. 24 Left palp. Fig. 25 Chelicera. Scale line = 250 μ m (Figs. 18-19), 70 μ m (Figs. 20-21), 100 μ m (Figs. 22-25).



Figures 26-35. *Pseudohydryphantes vepres* sp. nov. Figs. 26-28, 33, holotype male. Figs. 29-31, 34, paratype female, K228. Fig. 32, paratype male, K314. Fig. 35, paratype deutonymph, K326. Fig. 26 Dorsal view. Fig. 27 Ventral view. Fig. 28 Left palp. Fig. 29 Right leg I. Fig. 30 Right leg IV. Fig. 31 Claw of right leg IV. Fig. 32 Chelicera. Figs. 33-35 Genital field. Scale line = 190 μ m (Figs. 26-27), 70 μ m (Figs. 28, 33-35), 100 μ m (Figs. 29-30, 32), 20 μ m (Fig. 31).

K325-326(1 ♂, 1 deutonymph, slides). Same data except 28 Nov 1982, NMV K327-331(1 ♂, 4 deutonymphs, fluid). Same data except 29 Jan 1983, NMV K332-334(1 ♂, 2 ♀♀, fluid); ANIC (1 male, 1 ♀, fluid); AM KS 15998-15999(1 ♂, 1 ♀, fluid).

Diagnosis. Pedal claws with ventral serrations; sclerites associated with glandularia crescent shaped; chelicerae not elongate.

Description. Adults: Integument papillate. Lateral eyes on ocular tubercles; anterior-lateral eye larger than posterior-lateral eye; preocularia nearly contiguous with lateral eyes; postocularia posterior to median eye (Fig. 26). Six pairs of dorsoglandularia, five pairs of lateroglandularia and five pairs of ventroglandularia present (Figs. 26-27); sclerites associated with glandularia crescent shaped (Figs. 26-27); vg3 on same level as or slightly anterior to anus (Fig. 27). Genital flaps of male wider than those of female, mesal edge with a row of long setae, especially on posterior edge in male (Figs. 33-34); three pairs of acetabula (Figs. 33-34), first pair longest; first two pairs elliptical; third pair ovoid. Ejaculatory complex not studied. Chelicera (Fig. 32) of normal proportions, cheliceral claw curved, with 10-13 short teeth; cheliceral lamella about half as long as claw. Palp (Fig. 28): tibia with a thickened, sub-distal seta on medial surface and with distal extension. Coxae I-III with 1-2 stout, often serrate setae on distal ends (Fig. 27). Legs III and IV (Fig. 30) with swimming setae arranged as follows: leg III: male: telofemur 0, genu 1-2 and tibia 1-4; female: telofemur 0, genu 1, tibia 2; leg IV: male: telofemur 0, genu 1-3, tibia 2-5; female: telofemur 0, genu 1, tibia 2-3. Tarsi with dorsal notch. Pedal claws with large serrations on internal margins and with fewer serrations on external margins that are restricted to distal end; without a dorsal tooth (Fig. 31). Anus surrounded by sclerotized ring (Fig. 27).

Dimensions (µm): male (female): body 650-810/450-490 (850-1160/540-700); capitulum length 200-245 (225-280); chelicera length 240-270 (280-285); genital field 130-165/100-125 (165-190/115-150); palp: trochanter 40-45 (40-45), femur 60-75 (65-80), genu 40-50 (45-55), tibia 100-125 (110-130), tarsus 25-35 (30-35); leg I: trochanter 50-60 (55-65), basifemur 50-60 (45-65), telofemur 70-85 (80-95), genu 90-115 (105-135), tibia 110-140 (135-155), tarsus 130-160/55-60 (150-

165/60-65); leg IV: trochanter 70-100 (105-110), basifemur 65-85 (75-95), telofemur 100-120 (105-135), genu 155-195 (180-220), tibia 160-200 (180-220), tarsus 145-185/55-60 (160-180/50-60).

Deutonymphs: Lateral eyes on ocular tubercles. Glandularia as in adults except that vg3 lacks a glandularium and is reduced to a single seta. Genital flaps small, with 2-3 pairs of setae (Fig. 35); two pairs of ovoid acetabula (Fig. 35). Palp and legs as in adults except that slightly fewer swimming setae are present on legs III and IV.

Dimensions (µm): body 450-600/300-330; genital field 60-75/80-90.

Etymology. The specific epithet, Latin *vepres* (brier, bramble) refers to the serrate tarsal claws.

Remarks. *Pseudohydryphantes vepres* most closely resembles the New Zealand species *P. bebelus* in the possession of serrate tarsal claws, but the serrations of *P. vepres* are larger than those of *P. bebelus*, and *P. vepres* possesses incomplete sclerotized rings surrounding the glandularia, whereas *P. bebelus* possesses complete rings. The reduced number of swimming setae is also diagnostic.

The reduced number of swimming setae suggests that this species may be a poor swimmer, and may be correlated with the large serrations on pedal claws. The collection sites of the Victorian material were described by Malipatil and Blyth (1982).

***Pseudohydryphantes occabus* sp. nov.**

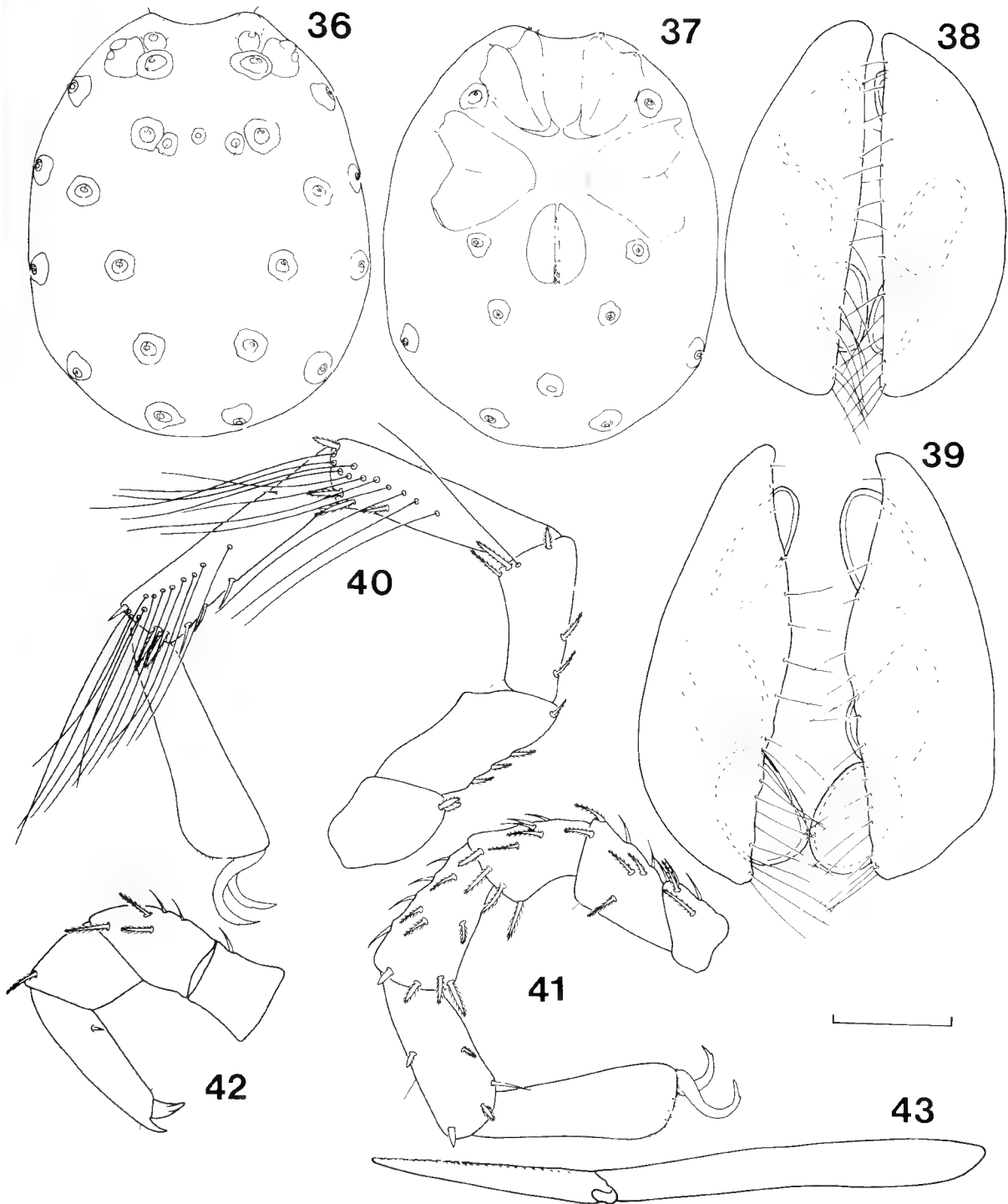
Figures 36-43

Type material. Holotype: Victoria, Shaw Creek, Bennison Plains (stn Mc9-1), 15 Feb 1977, NMV K229(♂, body in fluid, appendages on slide).

Paratypes: Victoria. Same data as holotype, NMV K230(1 ♀, body in fluid, appendages on slide); CNC(1 ♀, slide). Same data except stn Mc9-2, NMV K335(1 ♀, fluid). Mitta Mitta River, 14 km NW of Dartmouth Dam Wall (site 3), 14 Nov 1977, NMV K226(1 ♂, slide).

Diagnosis. Pedal claws ventrally smooth; sclerites associated with glandularia ring shaped; chelicerae elongate.

Description. Integument papillate. Lateral eyes on ocular tubercles; anterior-lateral eye larger than posterior-lateral eye; preocularia approaching lateral eyes, more so in male (Fig. 36); median



Figures 36-43. *Pseudohydryphantes occabus* sp. nov. Figs. 36-38, 40-42, holotype male. Fig. 39, paratype female, K230. Fig. 43, paratype male, K226. Fig. 36 Dorsal view. Fig. 37 Ventral view. Fig. 38 Genital field. Fig. 39 Genital field. Fig. 40 Left Leg IV. Fig. 41 Left leg I. Fig. 42 Right palp. Fig. 43 Right chelicera. Scale line = 300 μ m (Figs. 36-37), 70 μ m (Figs. 38-39), 100 μ m (Figs. 40-43).

eye pigmented; postocularia on same level as median eye and dg3. Six pairs of dorsoglandularia, five pairs of lateroglandularia, and five pairs of ventroglandularia present (Figs. 36-37); dg4 further laterad than dg3 (Fig. 36); vg3 anterior to anus and vg4, closer to genital field (Fig. 37); sclerites associated with glandularia ring shaped (Figs. 36-37). Genital flaps of male wider than those of female, mesal edge with a row of long setae, especially on posterior edge (Figs. 38-39); three pairs of ovoid acetabula (Figs. 38-39). Ejaculatory complex not studied. Chelicera (Fig. 43) very long, claw straight, with 33-34 short teeth; cheliceral lamella apparently absent. Capitulum with long, down-turned anterior extension to accommodate chelicerae. Palp (Fig. 42): tibia with a thickened, sub-basal seta on medial surface, larger in female, and with distal extension. Coxae I-III with 1-2 stout setae on distal ends (Fig. 37). Legs III and IV (Fig. 40) with swimming setae arranged as follows: leg III: male: telofemur 1, genu 11, tibia 12-16; female: telofemur 1, genu 10-12, tibia 9-13; leg IV: male: telofemur 1, genu 10-11, tibia 12; female: telofemur 1-2, genu 14-17, tibia 14-18; mostly on internal face, except for some setae of female which are on external face. Pedal claws without serrations but with a dorsal tooth (Figs. 40-41). Anus surrounded by sclerotized ring (Fig. 37).

Dimensions (μm): male (female): body 950-1060/660-870 (950-1230/810-1060); capitulum length ?; chelicera length ? (660); genital field 200/150-185 (195-235/170-210); palp: trochanter 55-60 (45-70), femur 105-110 (120-130), genu 75-80 (80-90), tibia 180 (195-210), tarsus 35-40 (40); leg I: trochanter 70 (60-65), basifemur 90-95 (85-125), telofemur 100-105 (100-115), genu 130-135 (130-160), tibia 165 (155-190), tarsus 195-200/65 (180-220/70-75); leg IV: trochanter 100-130 (115-140), basifemur 120-130 (115-145), telofemur 145 (145-180), genu 205-210 (205-255), tibia 235-240 (235-295), tarsus 230-240/65 (245-275/60-80).

Etymology. The specific epithet, Latin *occabus* (collar), refers to the completely sclerotized rings surrounding the glandularia.

Remarks. This species is most similar to *P. bebelus* in the possession of complete rings surrounding the glandularia but differs in lacking serrate tarsal claws and in possessing elongate chelicerae.

It resembles *P. stylatus* in the possession of elongate chelicerae that fit into a long, down-turned extension of the capitulum, and it resembles males of *P. stylatus* in the possession of a sub-basal seta on the palpal tibia and in the position of vg3 which is anterior to the anus and vg4.

The Shaw Creek site was described by Malipatil and Blyth (1982) and the Mitta Mitta site by Blyth et al. (1984).

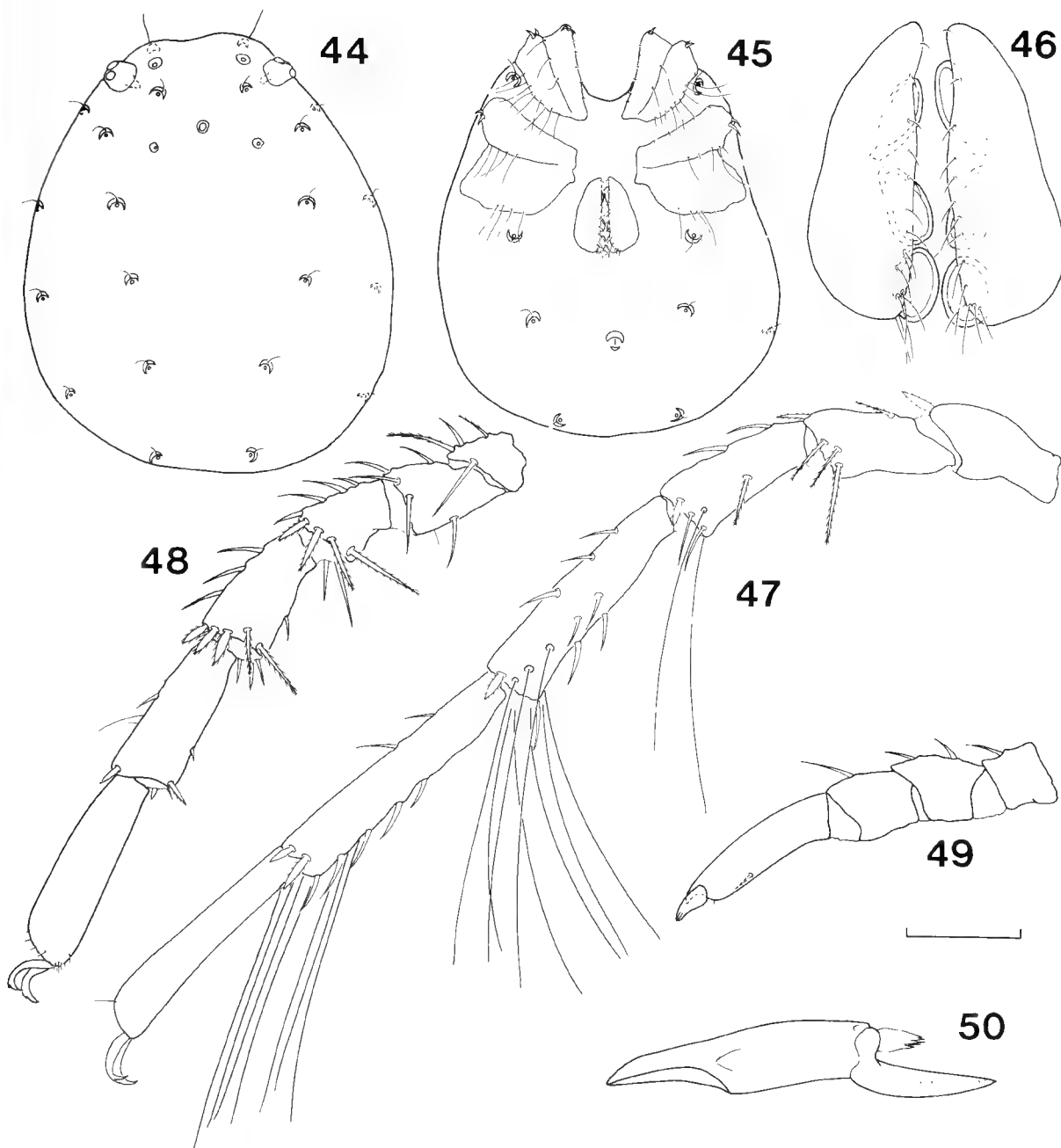
***Pseudohdryphantes cooki* sp. nov.**

Figures 44-50

Type material. Holotype: Victoria, Lerderderg River, 4.8 km WNW of Blackwood, M.S. Harvey and R. St Clair, 8 Jan 1986, NMV K368(σ , slide).

Diagnosis. Pedal claws ventrally smooth; sclerites associated with glandularia crescent shaped; chelicerae not elongate; tarsi not particularly stout.

Description. Male: Integument papillate. Lateral eyes on ocular tubercles; posterior-lateral eye about same size as posterior-lateral eye; postocularia posterior to median eye and to dg3 (Fig. 44). Six pairs of dorsoglandularia, five pairs of lateroglandularia and five pairs of ventroglandularia present (Figs. 44-45); sclerites associated with glandularia crescent shaped (Figs. 44-45); vg3 slightly anterior to anus and vg4 but not approaching genital flaps (Fig. 45). Genital flaps with a mesal row of setae, which are longer posteriorly (Fig. 46); three pairs of acetabula (Fig. 46), first pair longest; first two pairs elliptical, third pair ovoid. Ejaculatory complex with proximal arm slightly longer than proximal chamber. Chelicera (Fig. 50) of normal proportions, cheliceral claw curved, with 14 short teeth; cheliceral lamella nearly half as long as claw, serrate. Capitulum without long, down-turned anterior extension. Palp (Fig. 49): tibia with a thickened sub-distal seta on medial surface and with distal extension. Coxae I-III with 1-3 stout setae on distal ends (Fig. 45). Legs III and IV with swimming setae arranged as follows: leg III: telofemur 2, genu 7-8, tibia 7-8; leg IV: telofemur 2, genu 8, tibia 7. Pedal claws without serrations, but with a dorsal tooth (Figs. 47-48). Anus only partially surrounded by two semi-circular sclerites.



Figures 44-50. *Pseudohydryphantes cooki* sp. nov. Holotype male. Fig. 44 Dorsal view. Fig. 45 Ventral view. Fig. 46 Genital field. Fig. 47 Right leg IV. Fig. 48 Right leg I. Fig. 49 Left palp. Fig. 50 Left chelicera. Scale line = 250 μ m (Figs. 44-45), 70 μ m (Fig. 46), 100 μ m (Figs. 47-50).

Dimensions (μ m): body 990/720; capitulum 235; chelicera length 350; genital field 180/155; palp: trochanter 53, femur 90, genu 77, tibia 162,

tarsus 37; leg I: trochanter 65, basifemur 75, telofemur 85, genu 130, tibia 150, tarsus 180/50; leg IV: trochanter 125, basifemur 105, telofemur

150, genu 220, tibia 250, tarsus 220/40.

Etymology. This species is named for Prof. D.R. Cook, who has assisted this project immeasurably.

Remarks. *Pseudohydryphantes cooki* appears to be most similar to *P. crassipes* from which it is easily separated by the shape of the sclerites associated with the glandularia and the size of the pedal tarsi. The collection site was described by Boulton and Smith (1985).

Cyclohydryphantes Lundblad

Cyclohydryphantes Lundblad, 1941: 111.—Cook, 1974: 89. (Type species *Cyclohydryphantes trabeculiferus* Lundblad, 1941, by original designation.)

Diagnosis. Swimming hairs present on legs III and IV; dorsal plates absent; peripheral glandularia platelets present; lateral eyes on ocular tubercles; median eye present; body not elongate.

Remarks. The genus *Cyclohydryphantes* has until now contained only the type species, *C. trabeculiferus*, from Victoria and Tasmania. The new species described below from north Queensland extends the known distribution of the genus and the subfamily Pseudohydryphantinae into the tropics.

***Cyclohydryphantes mutarnee* sp. nov.**

Figures 51-57

Type material. Holotype: Queensland, Crystal Creek at Bruce Highway near Mutarnee, 18°58'S, 146°17'E, M.S. Harvey and P.J. Vaughan, 13 Jul 1986, NMV K707(♂, slide).

Diagnosis. Body noticeably longer than wide, 765 µm in length; tibiae III and IV with 6-8 swimming setae.

Description. Male: Integument papillate. Lateral eyes on ocular tubercles; anterior-lateral eyes larger than posterior-lateral eyes; median eye on same level as dg2 (Fig. 51). Six pairs of dorsoglandularia, five pairs of lateroglandularia and five pairs of ventroglandularia present (Figs. 51-52); dg3 laterally displaced, on same level as postocularia (Fig. 51); sclerites associated with dg4, dg5, dg6 and all ventroglandularia ring-shaped, others with elongate platelets (Figs. 51-52). Genital flaps with a mesal row of setae which

are longer posteriorly and with a few small setae scattered on flaps (Fig. 56); three pairs of acetabula (Fig. 56), first two pairs elliptical, third pair ovoid. Ejaculatory complex with proximal arm slightly longer than proximal chamber. Chelicera (Fig. 57) of normal proportions, cheliceral claw curved, with 15 short teeth; cheliceral lamella over half as long as claw. Capitulum without long, downturned anterior extension. Palp (Fig. 53): tibia with a thickened sub-distal seta on medial surface and with distal extension. Coxae I, II and III with 1-2 stout setae on distal ends (Fig. 52). Legs III and IV with swimming setae arranged as follows: leg III: telofemur 1, genu 7, tibia 6-7; leg IV: telofemur 2, genu 7, tibia 7-8. Pedal claws without serrations, but with a dorsal tooth (Figs. 54-55). Anus surrounded by sclerotized ring (Fig. 52).

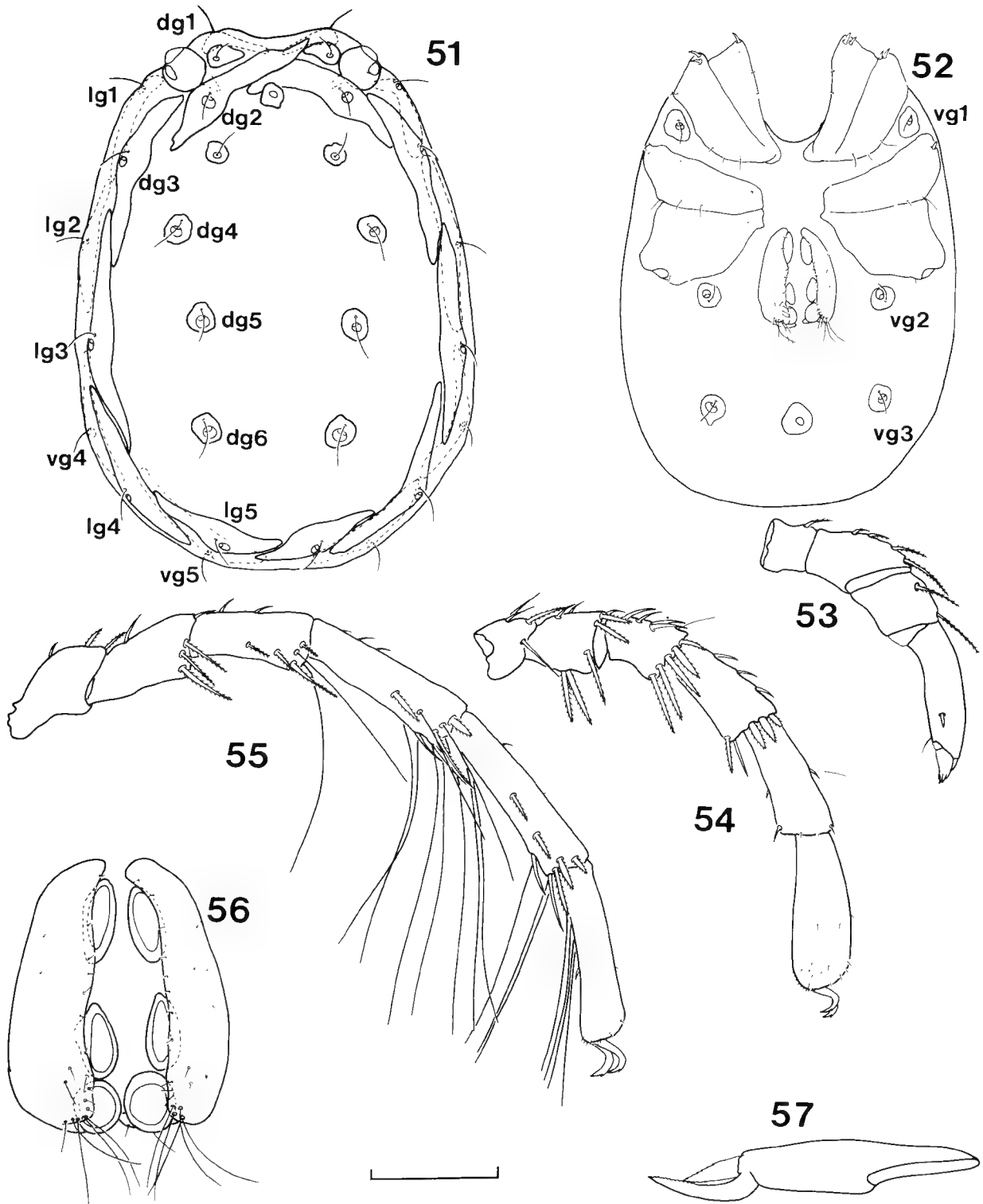
Dimensions (µm): body 765/555; capitulum length ?, chelicera length 270; genital field 145/115; palp: trochanter 40, femur 85, genu 50, tibia 125, tarsus 35; leg I: trochanter 50, basifemur 65, telofemur 75, genu 95, tibia 110, tarsus 135/50; leg IV: trochanter 90, basifemur 85, telofemur 95, genu 145, tibia 160, tarsus 150/40.

Etymology. The specific epithet is a noun in apposition derived from the type locality.

Remarks. *Cyclohydryphantes mutarnee* is much smaller and more elongate than *C. trabeculiferus* (a male of *C. trabeculiferus* from Tasmania in the Museum of Victoria is 1405 µm in length), and the arrangement of the lateral glandularia platelets is different.

Acknowledgements

I wish to thank Prof. David Cook for invaluable assistance during a month-long stay at the Museum of Victoria and for reviewing the manuscript, Andrew Boulton and Maryanne McKaige for supplying specimens, John Blyth for support, Dr I.M. Smith for graciously returning some Museum of Victoria water mites for me to describe, Dr T. Kronestedt for the loan of the specimen of *T. romanica*, the Australian Biological Resources Study for funds and Robin Wilson and Andrew Boulton for critically reviewing the manuscript.



Figures 51-57. *Cyclohydriphantes mutarnee* sp. nov. Holotype male. Fig. 51 Dorsal view. Fig. 52 Ventral view. Fig. 53 Left palp. Fig. 54 Left leg I. Fig. 55 Left leg IV. Fig. 56 Genital field. Fig. 57 Left chelicera. Scale line = 170 μ m (Figs. 51-52), 100 μ m (Figs. 53-55, 57), 70 μ m (Fig. 56).

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GRYMEUS, A NEW GENUS OF POUCHED OONOPID SPIDER
FROM AUSTRALIA (CHELICERATA: ARANEAE)

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Abstract

Harvey, M.S., 1987. *Grymeus*, a new genus of pouched oonopid spider from Australia (Chelicerata: Araneae). *Mem. Mus. Vict.* 48: 123-130.

A new genus, *Grymeus*, is described for three new species, *G. robertsi* (type species) and *G. yanga*, from western Victoria and south-western New South Wales, and *G. barbatus* from central South Australia. It is unusual due to the presence of extensive, setaceous book-lung covers and a male pouch formed by the modification of the maxillae, labium and sternum. The genus is compared with other pouched oonopids from South America.

Introduction

Only four species of oonopid spiders have been previously described in which males are known to possess modified maxillae, labia and sterna forming a cavity to protect the distal portions of the palp: *Gamasomorpha wasmanniae* Mello-Leitão, *G. patquiana* Birabén, *Marsupopaea sturmi* Cooke and *M. cupida* (Keyserling). All are from South America. Recent field work in the semi-arid regions of Australia has uncovered three further species with similar modifications which are described below.

Specimens are lodged in the Museum of Victoria, Melbourne (NMV), the Australian National Insect Collection, Canberra (ANIC) and the South Australian Museum, Adelaide (SAM). Most terminology follows Forster (1967) and the terminology of the female genitalia follows Forster and Platnick (1985). All measurements are taken to the nearest 0.005 mm. Two specimens of *Grymeus robertsi* were air-dried and gold-coated for examination in a JEOL JSM-35C Scanning Electron Microscope. The respiratory system and female genitalia were examined by separating the abdomen from the cephalothorax and removing the dorsal abdominal plate. The ventral portion of the abdomen was then cleared by heating in 10% potassium hydroxide.

Oonopidae

Grymeus gen. nov.

Type species. Grymeus robertsi sp. nov.

Diagnosis. *Grymeus* differs from all other known oonopid genera by the possession of setaceous book-lung covers (Fig. 9), stout, blunt, carinate setae (Fig. 10), and the distal patch of curved setae on the male palpal cymbium (Figs. 5, 15, 20). Males further differ by the combined presence of a pouch (Fig. 7) and the absence of porrect cheliceral setae (Figs. 2, 7, 12, 18).

Description. Colour dark red-brown. Carapace, abdomen, palps and legs with stout, blunt, carinate setae (Fig. 10); sternum with thinner setae. Carapace (Figs. 1-2, 11-12, 17-18) pear-shaped in dorsal view; clypeus with several stout, forwardly projecting setae. Six eyes; from above, posterior eye row slightly recurved; PME largest. Chelicera without teeth; with lamella; fang without proximal lobe. Maxillae convergent, nearly touching in midline (Fig. 7); labium rounded anteriorly (Fig. 7); maxillae and labium of male depressed, which together with anterior invagination of sternum form a pouch receiving terminal elements of palp (Fig. 7); sternum posteriorly rounded (Figs. 3-4, 13-14, 19); carapace and sternum joined by chitinous inter-coxal strips. Male palp (Figs. 5, 15, 20-21) with embolus and conductor gently curved, lying nearly at right angles to cymbium and in pouch (Fig. 7); cymbium with distal patch of curved setae; conductor lying beneath embolus; embolus apically divided into 2 separate flanges; tibia with 2 serrate trichobothria. Female palp without claw;

tibia with 2-3 serrate trichobothria. Leg formula 4123; legs relatively stout, without spines; tibiae with 1 sub-basal and 2 medial serrate trichobothria and metatarsi with 1 distal serrate trichobothrium; tarsal organ near distal end of tarsi, structure as in Fig. 8; onychium present, each bearing 2 doubly pectinate claws and 2 large and several smaller spatulate hairs. Abdomen with extensive dorsal and ventral plates (Figs. 1-4, 11-14, 17-19), the former generally overlapping the latter; female ventral plate divided into 2 by epigastric furrow which extends to lateral margins of ventral plate; male epigastric furrow not extending to lateral margins of ventral plate. Male genital aperture situated slightly anterior of epigastric furrow, genitalia not studied. Female genitalia (Figs 6, 16) with thick transverse muscle plate from which arises an anterior spherical lobe and a distally broadened anterior receptaculum, and a large, thin-walled posterior receptaculum; secretory gland not apparent; *G. yanga* also possesses a pair of cuticular patches fused to internal surface of abdominal wall (Fig. 16). Book-lung covers consisting of reticulated, matted setae that arise from setal bases (Fig. 9); covers nearly touching in midline above petiole; tracheal openings situated within tracheal slit situated behind epigastric furrow, tracheae extending into prosoma. Six spinnerets surrounded by a circular scute plus dorsal semi-circular scute; sclerotized colulus present, with 2 setae.

Etymology. The generic name is from the Greek *grymea* (bag) and refers to the pouch of the male (masculine).

Remarks. *Grymeus* resembles *Gamasomorpha*

Karsch and related genera, but differs most notably by the presence of (a) setaceous book-lung covers, (b) stout, blunt, carinate setae on most of the body, and (c) the male pouch. Brignoli (1974) noted that the palp of *Gamasomorpha cataphracta* Karsch, the type species, rests on a small ledge of the sternum, and I have examined several similar Australian species. Even though

this ledge may be considered a precursor of the pouch and hence limiting the value of the pouch as a generic character, none of these species possess the unusual book-lung covers characteristic of *Grymeus*. These covers are apparently unique within the Araneae, and a detailed study of their structure may prove to be of extreme interest.

Species of *Grymeus* most closely resemble two South American species, *Ga. wasmanniae* and *Ga. patquiana*, males of which possess a pouch but lack the setaceous book-lung covers and stout setae (Birabén, 1954). Males of these two species further differ by the presence of porrect cheliceral setae (Birabén, 1954). To fully reflect the apparent sister-group relationship of *Grymeus* and the two South American species, the latter probably deserve to be removed from *Gamasomorpha* to a new genus.

The only other described oonopids with a male pouch are the two Colombian species of the genus *Marsupopaea* Cooke, *M. sturmi* (male holotype in the American Museum of Natural History, New York, examined) and *M. cupida*. *Marsupopaea* appears to be unrelated to *Grymeus* or the two *Gamasomorpha* species mentioned above and is more closely related to species of *Opopaea* Simon due to similarities of the male palp (Cooke, 1972).

Key to species of *Grymeus*

1. Males2
- Females (those of *G. barbatus* not known)4
2. Carapace with 2 or 3 longitudinal dorsal rows of stout setae (Figs. 11-12); small patch of tubercles present above petiole*G. yanga*
- Carapace without longitudinal dorsal rows of stout, long setae (Figs. 1-2); patch of tubercles not present above petiole3
3. Setae anterior to genital operculum very long and curved (Fig. 19); genital operculum situated in middle of abdomen (Fig. 19)*G. barbatus*
- Setae anterior to genital operculum short and virtually straight (Fig. 3); genital operculum situated in anterior third of abdomen (Fig. 3)*G. robertsi*

4. Carapace with 2 or 3 longitudinal dorsal rows of stout setae (Figs. 11-12); small patch of tubercles present above petiole; female genitalia with paired cuticular patches fused to internal abdominal wall (Fig. 16).....*G. yanga*
- Carapace without longitudinal dorsal rows of stout, long setae (Figs. 1-2); patch of tubercles not present above petiole; female genitalia without paired cuticular patches fused to internal abdominal wall (Fig. 6)*G. robertsi*

***Grymeus robertsi* sp. nov.**

Figures 1-10

Type material. Holotype: Victoria, Horseshoe Bend, Little Desert National Park (36°32'S, 142°01'E), under bark of *Eucalyptus camaldulensis*, M.S. Harvey and B.E. Roberts, 6 Jul 1982, NMV K209 (♂).

Paratypes: Victoria. Same data as holotype, NMV K210-222 (5 ♂♂, 8 ♀♀); ANIC (2 ♂♂, 2 ♀♀: 1 ♂, 1 ♀ gold-coated for SEM). 4 km S of Horseshoe Bend, Little Desert National Park, ex leaf litter of *Astroloma conostephioides*, M.S. Harvey and B.E. Roberts, 6 Jul 1982, NMV K223 (1 ♂). Mt Arapiles (36°45'S, 141°50'E), 365 m, ex leaf litter of *E. goniocalyx*, M.S. Harvey and D.C.F. Rentz, 27 Oct 1983, ANIC, Berlesate No. 898 (1 ♂). 15 km WNW of Yaapeet, Lake Albacutya Park, under bark of *E. camaldulensis*, M.S. Harvey and B.E. Roberts, 4 Jul 1982, NMV K224 (1 ♀).

Diagnosis. Carapace without longitudinal rows of long, stout, dorsal setae (Fig. 2). Small patch of tubercles above petiole lacking. Females lack paired cuticular patches fused to the internal abdominal wall anterior to genitalia and possess relatively smooth lateral margins of the muscle attachment plate (Fig. 6). Setae anterior to genital operculum not particularly elongate and only slightly curved (Figs. 3-4).

Description. Male: Total length 1.82-1.90. Carapace (Figs. 1-2) 0.77-0.80 long, 0.53-0.57 wide, 0.30-0.33 high, without longitudinal rows of stout, dorsal setae. Eye sizes of holotype: ALE 0.06, PME 0.07, PLE 0.05. Palp as in Fig. 5. Leg and palp measurements of holotype: leg I: femur 0.395, patella 0.19, tibia 0.295, metatarsus 0.21, tarsus 0.165, total 1.255; leg II: femur 0.355, patella 0.21, tibia 0.275, metatarsus 0.20, tarsus 0.14, total 1.18; leg III: femur 0.335, patella 0.17, tibia 0.25, metatarsus 0.185, tarsus 0.15, total 1.09; leg IV: femur 0.42, patella 0.22, tibia 0.325, metatarsus 0.22, tarsus 0.205, total 1.39; palp: femur 0.15, patella 0.08, tibia 0.09, tarsus 0.23, total 0.55. Abdomen (Figs. 1-3) 1.08-1.20 long, 0.70-0.77 wide. Genital operculum situated in anterior third of abdomen. Setae anterior to geni-

tal operculum not particularly elongate and only slightly curved.

Female: Total length 1.89-2.02. Carapace 0.71-0.77 long, 0.51-0.56 wide, 0.27-0.33 high. Eye sizes of K217: AME 0.05, PME 0.06, PLE 0.05. Leg and palp measurements of K219: leg I: femur 0.405, patella 0.225, tibia 0.25, metatarsus 0.20, tarsus 0.17, total 1.25; leg II: femur 0.35, patella 0.205, tibia 0.24, metatarsus 0.20, tarsus 0.155, total 1.15; leg III: femur 0.355, patella 0.18, tibia 0.235, metatarsus 0.19, tarsus 0.14, total 1.10; leg IV: femur 0.445, patella 0.23, tibia 0.31, metatarsus 0.255, tarsus 0.19, total 1.43; palp: femur 0.155, patella 0.105, tibia 0.07, tarsus 0.18, total 0.51. Abdomen (Fig. 4) 1.21-1.39 long, 0.77-0.81 wide. Genital operculum situated in anterior third of abdomen. Setae anterior to genital operculum not particularly elongate and only slightly curved. Genitalia (Fig. 6): lateral margins of muscle attachment plate relatively smooth; without paired cuticular patches fused to internal abdominal wall.

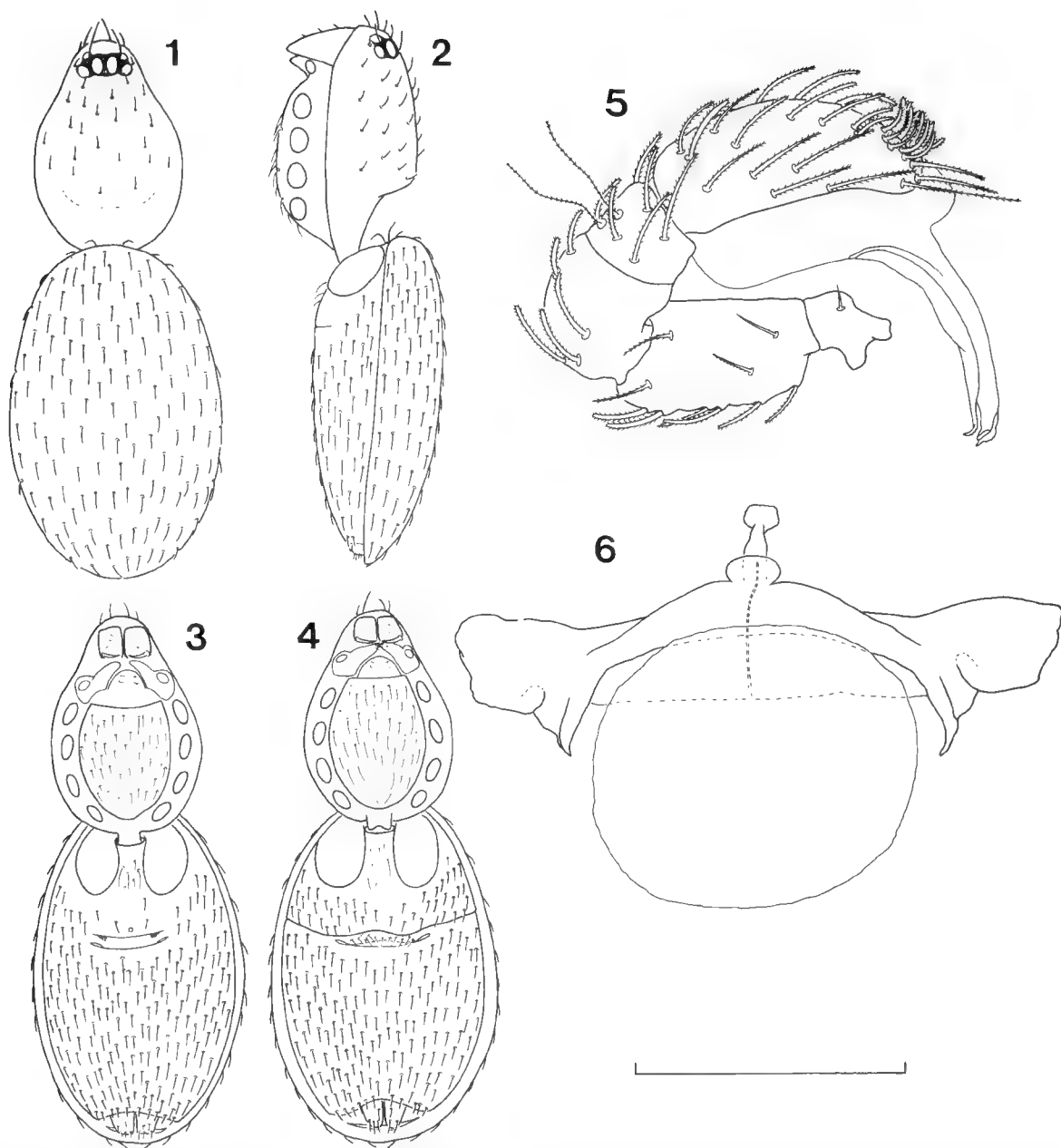
Etymology. This species is named for Bryan Roberts who assisted in the collection of most of the specimens.

Remarks. Although this species has been taken primarily under the bark of trees, two specimens have been collected from leaf litter. A single mating sequence was observed to take place under a sheet of *Eucalyptus camaldulensis* bark at Horseshoe Bend during October 1983 (the specimens were not collected). The male was positioned under the female and both were facing in the same direction with their ventral surfaces in contact. This corresponds to mating position III of Kaston (1948). No web was present.

***Grymeus yanga* sp. nov.**

Figures 11-16

Type material. Holotype: Victoria, 5 km W of Mildura (34°10'S, 142°06'E), under bark of *Eucalyptus camaldulensis*, M.S. Harvey, B.J. Scott and L.A. Hoare, 21 Sep 1985, NMV K344 (♂).



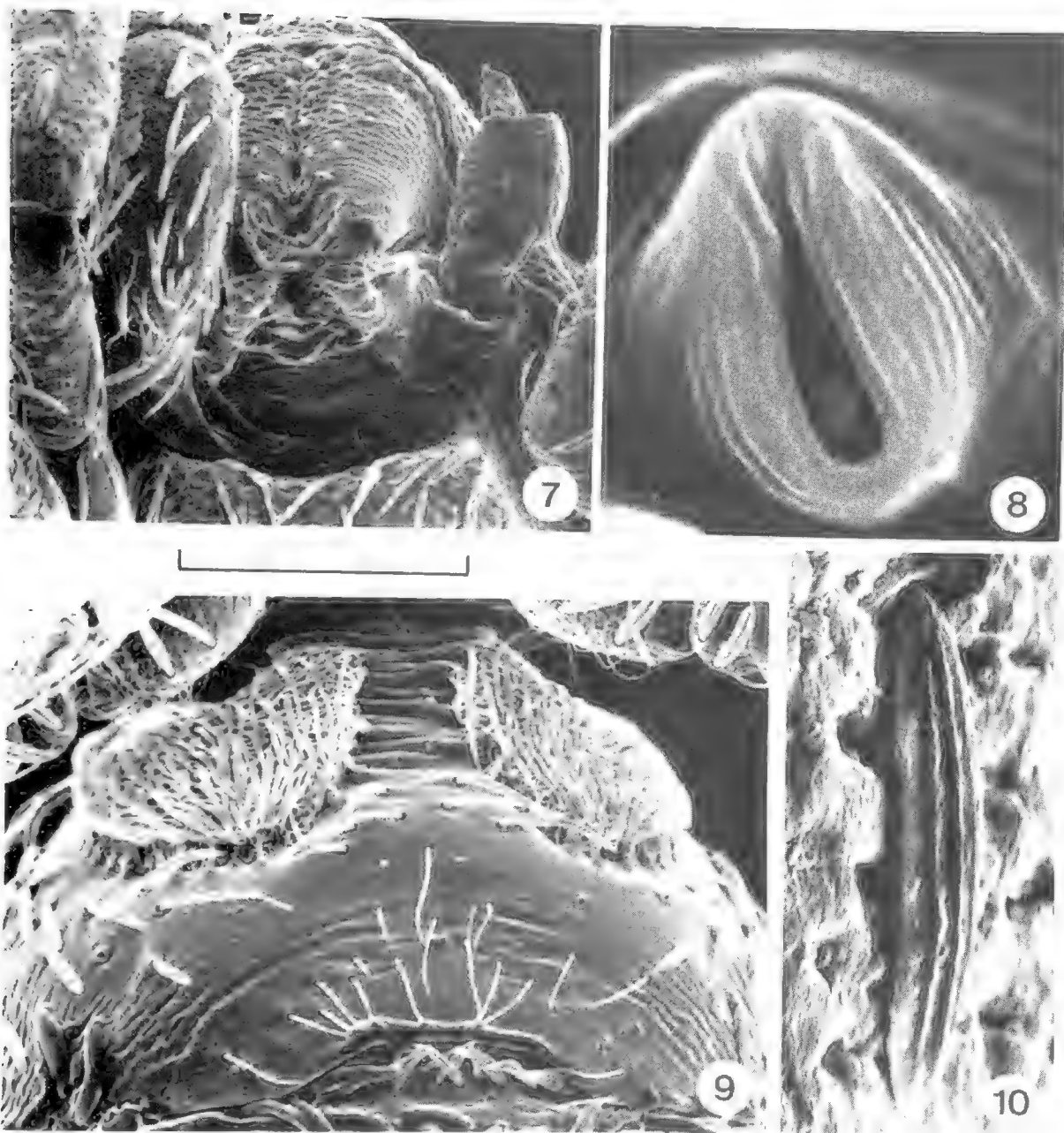
Figures 1-6. *Grymeus robertsi* sp. nov. Holotype male: Fig. 1, dorsal view. Fig. 2, lateral view. Fig. 3, ventral view. Paratype female, K219: Fig. 4, ventral view. Holotype male: Fig. 5, left palp, lateral view. Paratype female, K222: Fig. 6, genitalia, dorsal view. Scale line = 1.00 mm (Figs. 1-4), 0.24 mm (Fig. 5), 0.16 mm (Fig. 6).

Paratypes: Victoria. Same data as holotype, NMV K345-353 (4 ♂♂, 5 ♀♀).

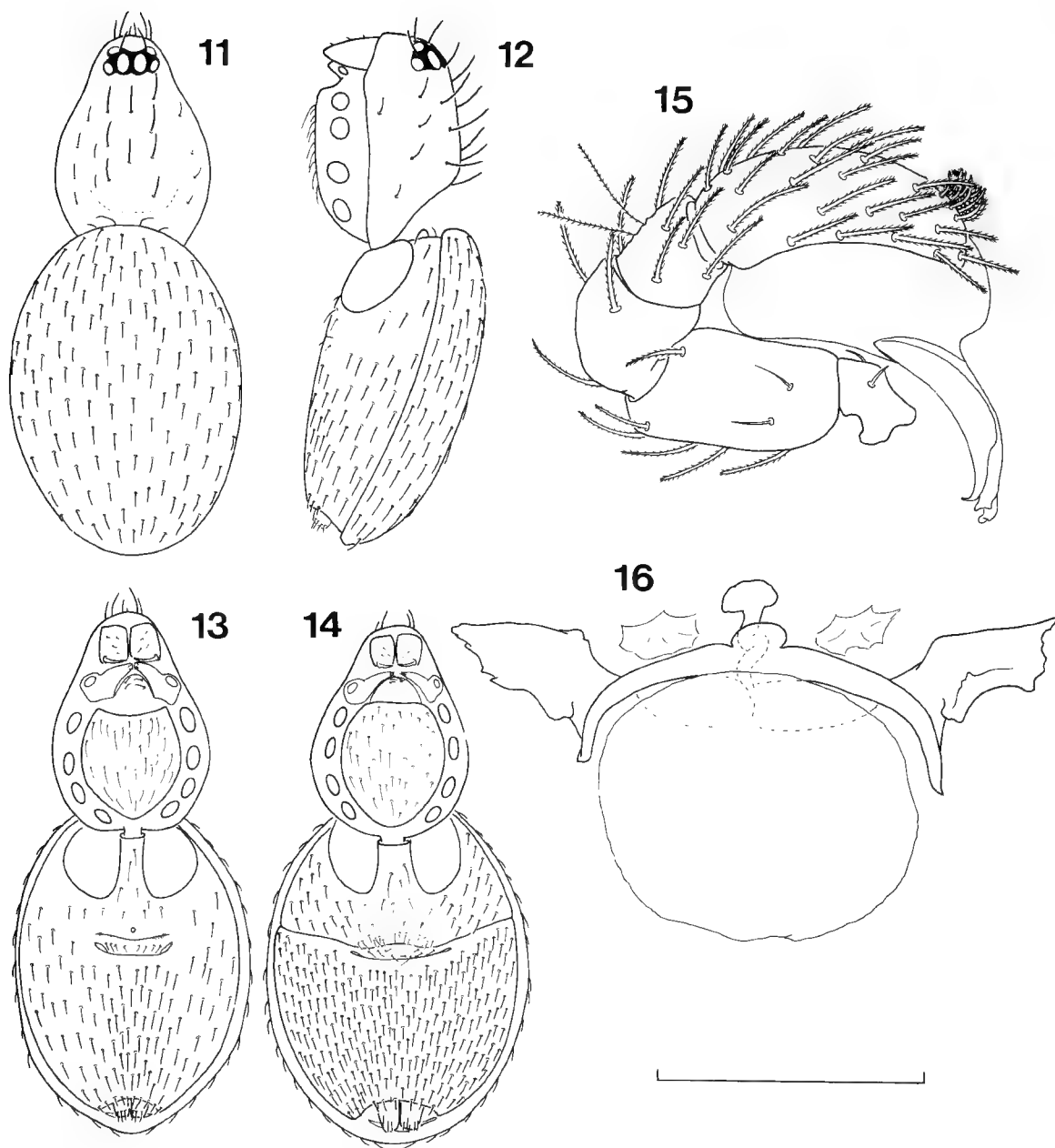
New South Wales, Yanga Lake (34°42'S, 143°35'E), under bark of *E. camaldulensis*, D.C.E. Rentz and M. S. Harvey, 24 Oct 1983, ANIC (1 ♀).

Diagnosis. Carapace with 2 or 3 longitudinal rows

of long, stout, setae (Figs. 11-12). Small patch of tubercles present above petiole. Females possess paired cuticular patches fused to internal abdominal wall anterior to genitalia and rough lateral margins to muscle attachment plate (Fig. 16).



Figures 7-10. Scanning electron micrographs of *Grymeus robertsi* sp. nov. Paratype male: Fig. 7, mouthparts and pouch, ventral view. Fig. 8, tarsal organ from leg II. Paratype female: Fig. 9, anterior portion of abdomen, ventral view. Paratype male: Fig. 10, seta from dorsal abdominal plate. Scale line = 0.10 mm (Figs. 7, 9), 0.005 mm (Fig. 8), 0.04 mm (Fig. 10).



Figures 11-16. *Grymeus yanga* sp. nov. Holotype male: Fig. 11, dorsal view. Fig. 12, lateral view. Fig. 13, ventral view. Paratype female, K349: Fig. 14, ventral view. Holotype male: Fig. 15, left palp, lateral view. Paratype female: Fig. 16, genitalia, dorsal view. Scale line = 1.00 mm (Figs. 11-14), 0.24 mm (Fig. 15), 0.16 mm (Fig. 16).

Setae anterior to genital operculum not particularly elongate and only slightly curved (Figs 13-14).

Description. Male: Total length 1.63-1.86. Cara-

pae (Figs. 11-12) 0.67-0.81 long, 0.555-0.605 wide, 0.315-0.35 high; with several rows of stout, slightly curved setae (Figs. 11-12). Eye sizes of holotype: ALE 0.055, PME 0.06, PLE 0.05. Palp as in Fig. 15. Leg and palp measurements of

holotype: leg I: femur 0.495, patella 0.24, tibia 0.305, metatarsus 0.29, tarsus 0.205, total 1.535; leg II: femur 0.435, patella 0.23, tibia 0.285, metatarsus 0.26, tarsus 0.205, total 1.415; leg III: femur 0.425, patella 0.205, tibia 0.265, metatarsus 0.255, tarsus 0.18, total 1.33; leg IV: femur 0.54, patella 0.295, tibia 0.385, metatarsus 0.345, tarsus 0.20, total 1.765; palp: femur 0.20, patella 0.115, tibia 0.085, tarsus 0.26, total 0.66. Abdomen (Figs. 11-13) 1.00-1.19 long, 0.725-0.85 wide. Genital operculum situated in anterior third of abdomen. Setae anterior to genital operculum not particularly elongate and only slightly curved. Small patch of tubercles present above petiole, possibly acting as stridulatory file, with the posterior margin of carapace acting as pick.

Female: Total length 1.80-2.00. Carapace 0.685-0.785 long, 0.575-0.59 wide, 0.295-0.35 high. Eye sizes of specimen from Yanga Creek: ALE 0.07, PME 0.06, PLE 0.04. Leg and palp measurements of specimen from Yanga Creek: leg I: femur 0.47, patella 0.25, tibia 0.325, metatarsus 0.29, tarsus 0.215, total 1.55; leg II: femur 0.44, patella 0.245, tibia 0.305, metatarsus 0.265, tarsus 0.23, total 1.485; leg III: femur 0.38, patella 0.22, tibia 0.29, metatarsus 0.27, tarsus 0.21, total 1.37; leg IV: femur 0.545, patella 0.295, tibia 0.395, metatarsus 0.335, tarsus 0.25, total 1.82; palp: femur 0.225, patella 0.075, tibia 0.09, tarsus 0.215, total 0.605. Abdomen (Fig. 14) 1.225-1.27 long, 0.88-0.98 wide. Genital operculum situated in anterior third of abdomen. Setae anterior to genital operculum not particularly elongate and only slightly curved. Small patch of tubercles present above petiole, as in male. Genitalia (Fig. 16): lateral margins of muscle attachment plate rough; paired cuticular patches fused to internal abdominal wall.

Etymology. The specific epithet is a noun in apposition taken from one of the collection sites.

Grymeus barbatus sp. nov.

Figures 17-21

Type material. Holotype: South Australia, 25 km SSW of Mabel Creek Homestead (29°10'S, 134°15'30"E), pitfall, stony tableland, CRA Survey, 28 Oct 1984, SAM N1986266 (♂).

Diagnosis (male only). Carapace without longitu-

dinal rows of long, stout, dorsal setae (Fig. 18). Small patch of tubercles above petiole lacking. Setae anterior to genital operculum very long and curved (Fig. 19).

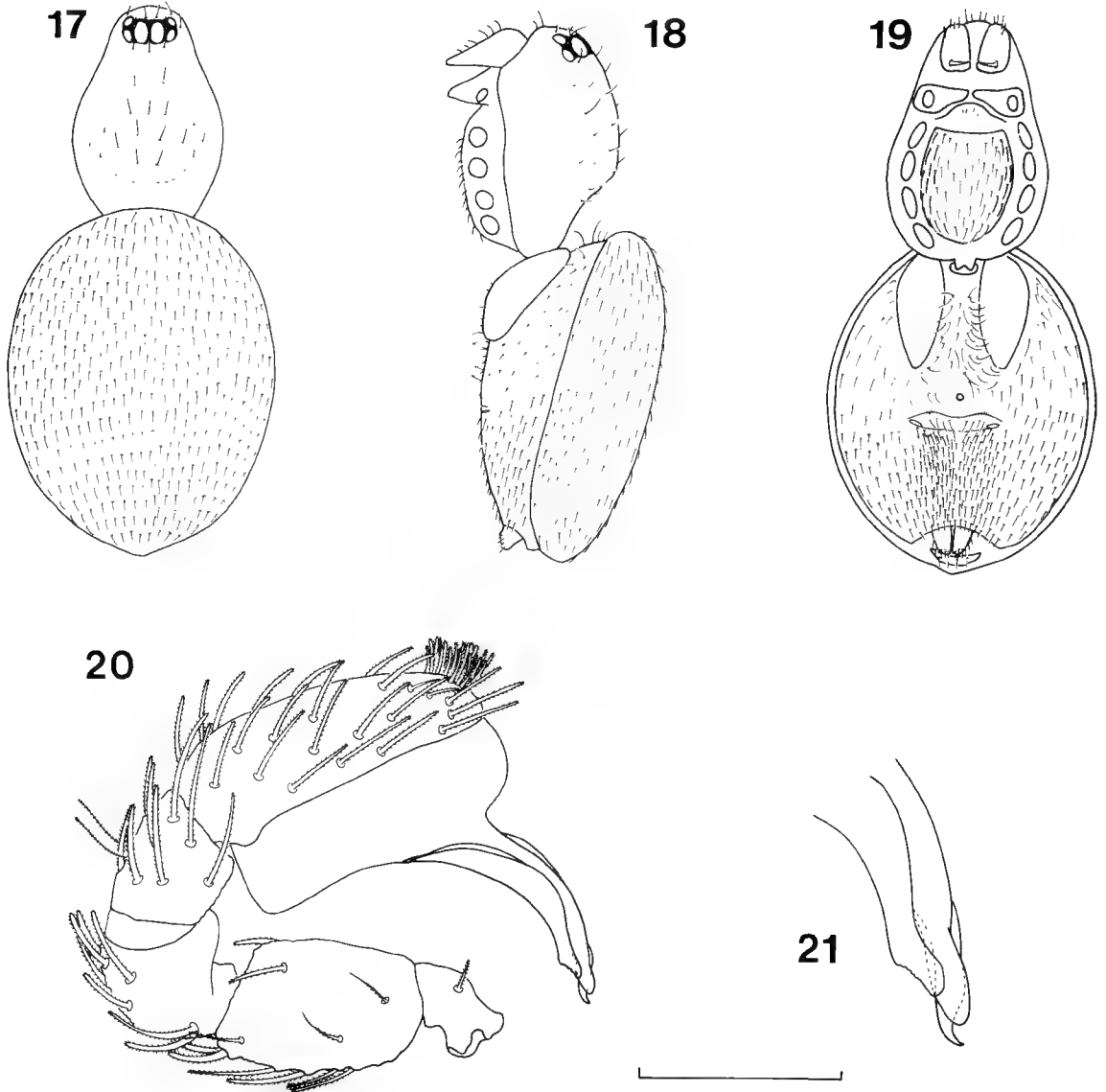
Description. Male: Total length 2.70. Carapace (Figs. 17-18) 1.10 long, 0.76 wide, 0.425 high, without longitudinal rows of stout, dorsal setae. Eye sizes of holotype: ALE 0.07, PME 0.11, PLE 0.06. Palp (Figs. 20, 21): conductor slightly dilated distally, with crenulate distal edge; one embolar flange hooked (Fig. 21). Leg and palp measurements of holotype: leg I: femur 0.675, patella 0.36, tibia 0.39, metatarsus 0.365, tarsus 0.21, total 2.00; leg II: femur 0.65, patella 0.34, tibia 0.38, metatarsus 0.36, tarsus 0.19, total 1.92; leg III: absent; leg IV: femur 0.765, patella 0.405, tibia 0.515, metatarsus 0.41, tarsus 0.245, total 2.34; palp: femur 0.25, patella 0.18, tibia 0.145, tarsus 0.38, total 0.955. Abdomen (Figs. 17-19) 1.70 long, 1.32 wide. Genital operculum situated in middle of abdomen (Fig. 19). Setae anterior to genital operculum very long and curved.

Etymology. From the Latin *barbatus* (bearded) referring to the long, curved setae anterior to the genital operculum.

Remarks. This is the largest species of the genus currently known. The holotype is not in perfect condition: the terminal segments of some legs are missing or damaged and both third legs are absent.

Acknowledgements

I wish to thank Dr N.I. Platnick (American Museum of Natural History, New York), Mr D.C. Lee and Mr D.B. Hirst (SAM) for the loan of material, the National Parks Service of Victoria for permission to collect in areas under their control, the Australian Biological Resources Study for funds, the Division of Entomology, CSIRO, for research facilities, K.A. Pickerd and C.D. Beaton for the scanning electron micrographs, those colleagues who either collected or assisted in the collection of specimens, M.R. Gray, B.Y. Main, R.J. Raven and especially R.J. Moran for helpful discussions, and R.J. Moran and R.B. Halliday for reviewing the manuscript.



Figures 17-21. *Grymeus barbatus* sp. nov., holotype male: Fig. 17, dorsal view. Fig. 18, lateral view. Fig. 19, ventral view. Fig. 20, left palp. Fig. 21, detail of embolus and conductor of left palp. Scale line = 1.00 mm (Figs. 17-19), 0.24 mm (Fig. 20), 0.12 mm (Fig. 21).

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IDENTITY OF SPECIES OF TRICHOPTERA DESCRIBED BY K. KORBOOT 1964-65 (INSECTA)

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Abstract

Neboiss, A., 1987. Identity of species of Trichoptera described by K. Korboot 1964-65 (Insecta).
Mem. Mus. Vict. 48: 131-140.

Species of Trichoptera described by Korboot in 1964-65 have been re-examined and their amended taxonomic positions are indicated. New illustrations are prepared to facilitate their identification.

Introduction

The identities of thirteen species of caddis-flies from Australia and New Guinea described in three papers by K. Korboot (1964a, b, 1965) have been of some concern. The descriptions contain a number of inaccuracies, and some descriptions do not correspond to the designated type material; the illustrations are too diagrammatic to permit positive identification. The entire material has now been re-examined and wherever possible new illustrations have been prepared

from freshly cleared abdomens of paratypic and positively identified material.

The original species names are listed here in the sequence they appear in the particular publications, followed by the present combination.

All holotypes and some paratypes of these species are deposited in the Queensland Museum collection, Brisbane (QM); the remaining material, including paratypes, is in the Entomology Department, University of Queensland, St Lucia (EQU).

1. 1964a "Four new species of caddis-flies from eastern Australia.":

<i>Oecetis situlus</i>	see <i>Oecetis australis</i> (Banks, 1920).
<i>Helicopsyche cochleaetesta</i>	see <i>Helicopsyche cochleaetesta</i> Korboot, 1964.
<i>Hydrobiosella letti</i>	see <i>Hydrobiosella letti</i> Korboot, 1964.
<i>Macronema torrenticola</i>	see <i>Baliomorpha banksi</i> (Mosely, 1953).

2. 1964b "Eight new species of caddis-flies from the Australian region.":

<i>Ornatus densus</i>	see <i>Tanorus densus</i> (Korboot, 1964).
<i>Austreclonina kenampi</i>	see <i>Polycentropus kenampi</i> (Korboot, 1964).
<i>Polycentropus niger</i>	see <i>Polycentropus similis</i> Kimmins, 1962.
<i>Symphitoneuria ampla</i>	see <i>Symphitoneuria ampla</i> Korboot, 1964.
<i>Triaenodes bernaysae</i>	see <i>Triaenodes bernaysae</i> Korboot, 1964.
<i>Hydropsyche flynni</i>	see <i>Hydropsyche flynni</i> Korboot, 1964.
<i>Abacaria barretti</i>	see <i>Abacaria barretti</i> Korboot, 1964.
<i>Herbertorossia rapsoni</i>	see <i>Herbertorossia orakaivai</i> Kimmins, 1962.

3. 1965 "A new species of caddis-fly from New Guinea.":

<i>Chimarra aiyura</i>	see <i>Chimarra aiyura</i> Korboot, 1965.
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Depository institutions for other material noted are: Australian National Insect Collection, Canberra (ANIC); Bernice P. Bishop Museum, Honolulu (BPBM); British Museum (Natural History) London (BMNH); and Natural History Museum, Sofia (NHMS).

The preparations made for this study bear the present author's notebook number with prefix "PT-". They have been cleared in KOH solution and transferred to glycerine for drawing and storage in microvials. The Queensland Museum type registration number has the prefix "T-".

Hydrobiosidae

Tanorus densus (Korboot)

Figures 1-3

Ornatus densus Korboot, 1964a: 48, figs. 4-6, 27 (not 29 as stated in description).

Tanorus densus.—Neboiss, 1984a: 180, figs. 4-7.

Type material. Holotype ♂, NEW GUINEA: Papua New Guinea, Mendi (6°10'S, 143°40'E), 5500 ft (1680 m), UV-light, 11 Oct 1960, J.H. Barrett, QM T-6189 (abdomen and wings on microscope slide). paratypes 2♂♂, collected with holotype, EQU (genitalia preparation PT-1250 figured).

Female unknown. No other material is available.

Diagnosis. The pocket-like folds of male forewings in resting position form a characteristic, horizontally flattened area above thoracic segments; ventral margin of segment 9 produced distally and thickened; tubercles at base of segment 10 bilobed.

Remarks. The generic name *Ornatus* Korboot, 1964b, was found to be preoccupied by *Ornatus* Laubenfels, 1955 (Porifera, Family Camerospongiidae); a new name, *Tanorus*, was introduced by Neboiss (1984a).

In comparing "*Ornatus*" with the Australian genus *Taschorema* Mosely, Korboot incorrectly described the latter as being without fork 4 in the forewing, and "*Ornatus*" hindwing with "scent organ . . . broad, thickened, dark in colour and thickly covered with hairs". There is no such structure (organ) present in the hindwing, although there is a large pocket-like fold in the forewing along vein A.

Distribution. New Guinea (central highlands).

Philopotamidae

Chimarra aiyura Korboot

Figures 4-6

Chimarra aiyura Korboot, 1965: 40, figs. 1-4.

Type material. Holotype ♂, NEW GUINEA: Papua New Guinea, Aiyura (6°20'S, 145°53'E), 5500 ft (1680 m), 12 Sep 1960, J.H. Barrett, QM T-6205; paratype ♂, collected with holotype, EQU (genitalia preparation PT-1307 figured).

Female unknown.

No other material is available.

Diagnosis. Male abdominal segment 9 with small ventral keel; U-shaped mesal excision at apex of segment 10; inferior appendages slender, evenly curved.

Remarks. The holotype abdomen is mounted on a microscope slide, but the individual parts of the genitalia are difficult to interpret; thus, the abdomen of the paratype was cleared, details were compared with the holotype and new figures prepared.

Distribution. New Guinea (central highlands).

Hydrobiosella letti Korboot

Figures 7,8

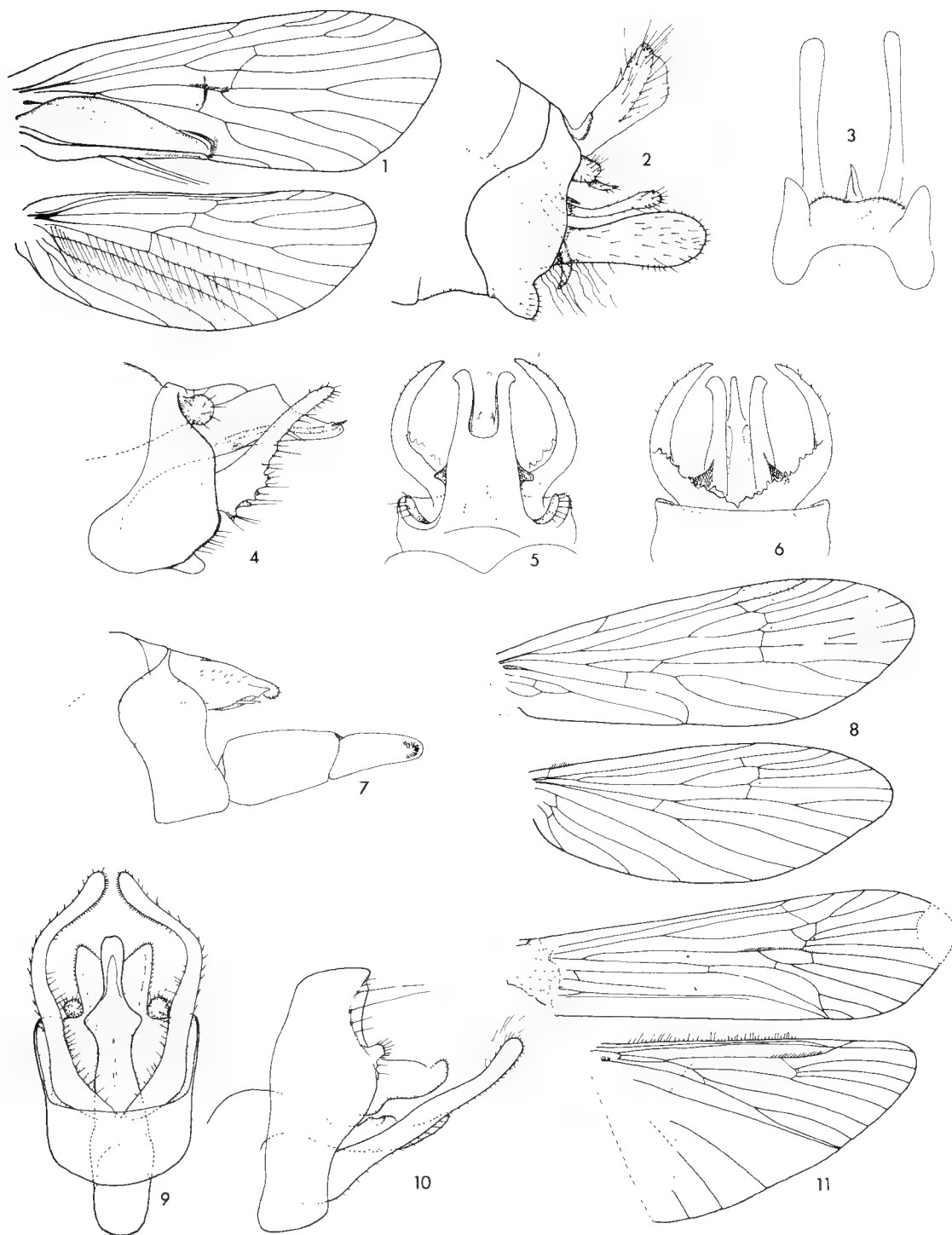
Hydrobiosella letti Korboot, 1964a: 36, figs. 40-57.

Type material. Holotype ♂, AUSTRALIA: New South Wales, Lett River nr Lithgow, 25 Sep 1962, Korboot, QM T-6182 (abdomen and wings mounted on microscope slides).

Female unknown. No new material is available.

Diagnosis. Male abdominal segment 9 short, without lateral excision, segment 10 in lateral view triangular, small, pointed lateral flange near apex; phallus with long sclerotized spine.

Remarks. Described from a single male specimen. The tip of the abdomen has been cleared and mounted on a microscope slide. The wings are mounted separately and consist of several broken pieces; the venation is reconstructed and shown in figure 8. The forewing length of 12 mm given in the description is an obvious error; the scale line given to figure 46 indicates the correct forewing length of 4.5 mm. The vial containing remaining body parts has two locality labels, one giving Lett River via Lithgow the other Montville, Qld as the place of collection. Details of the Lett



Figures 1-3, *Tanorus densus* (Korboot), paratype male: 1, wing venation; 2, genitalia lateral; 3, ventral. Figures 4-6, *Chimarra aiyura* Korboot, paratype male: 4, genitalia lateral; 5, dorsal; 6, ventral. Figures 7, 8, *Hydrobiosella letti* Korboot, holotype male: 7, genitalia lateral; 8, wing venation. Figures 9-11, *Baliomorpha banksi* (Mosely), holotype male of *M. torrenticola* Korboot; 9, genitalia ventral; 10, lateral; 11, wing venation.

River label correspond to the published information. No further specimens have been captured from either locality.

Distribution. Australia (eastern New South Wales).

Hydropsychidae

Baliomorpha banksi (Mosely)

Figures 9-11

Macronemum torrenticola Korboot, 1964a: 39, figs. 58-78.

Baliomorpha banksi.-Neboiss, 1984b: 130, figs. 9, 10, 35-38 (full synonymy).

Type material. Holotype ♂, AUSTRALIA: Queensland, Cedar Creek, Tamborine, 3 Oct 1962, Korboot (as in original publication) (QM T-6183); paratype ♀, same locality as holotype (QM T-6184).

Diagnosis. Forewings blackish with numerous pale yellow to golden spots scattered between the veins. Phallus expanded mid-laterally, apex upcurved.

Remarks. The species *M. torrenticola* was synonymized with *B. banksi* (Mosely) by Neboiss (1984b). The original description refers to a single specimen, the male holotype. However, further in the text wing measurements are given for both sexes. The holotype male is preserved in alcohol; the right side wings and abdomen are removed and mounted on microscope slide. In the same vial is one female specimen with head and right side wings detached and loose in the vial, a cast pupal shell is present also, but its identity is not confirmed.

The following labels are present: "Montville, Q. Mar. 1962. K.K. sp.R./ *Macronemum* sp. nov. E.F. Riek det. 1962/ *M. torrenticola* ♂ Holotype, Korboot/ QM reg.no ♂ Holotype T-6183; ♀ paratype T-6184". This locality and date disagree with label data on holotype slides which are the same as in the publication. The slide T-6183a contains male wings, but the slide T-6183b contains the abdomen of *Smicrophylax* sp. male.

There is also discrepancy in wing measurements as the holotype forewing length is 10 mm, not 16 mm as given in the description.

According to Dean (1984) the larva described and figured as *M. torrenticola* is an unidentified species of the subfamily Diplectroninae.

Distribution. Australia (north-east and south-east Queensland).

Hydropsyche flynni Korboot

Figures 12-15

Hydropsyche flynni Korboot, 1964b: 51, figs. 1-3, 26.

Hydropsyche papuana Kumanski, 1979: 202, figs. 21-23, syn. nov.

Type material. Holotype ♂ of *Hydropsyche flynni*, NEW GUINEA: Papua New Guinea, Laiagam (Liagam) (5°30'S, 143°25'E), 5700 ft (1730 m), 23 Mar 1963, J.H. Barrett (QM T-6185); paratypes 3 ♀ collected with holotype (EQU).

Holotype ♂ of *Hydropsyche papuana*, NEW GUINEA: Papua New Guinea, Telefomin (5°08'S, 141°30'E) 1660 m, 25 Jul-3 Sep 1975 (NHMS). Type not examined.

Other material examined. NEW GUINEA: 1 ♂, 21 ♀ ♀, Liagam, collected with holotype of *H. flynni*; (genitalia preparation PT-1340 ♂; PT-1348 ♀ figured) (EQU); 1 ♂, 4 ♀ ♀, Mendi (6°10'S, 143°40'E), 11 Oct 1960, J.H. Barrett (EQU).

Diagnosis. Distal margin of male abdominal segment 9 with rounded lateral lobe; segment 10 in lateral view raised mid-dorsally into a distinct hump, a pair of digitiform processes at apex. Female abdominal segment 9 with lateral cavity short, rounded.

Length of forewing: ♂ 13-16 mm; ♀ 17-19 mm.

Remarks. The type material of four specimens, the holotype male and three female paratypes, was selected by Korboot from the original series of 26 specimens. The remaining specimens (1 ♂, 21 ♀ ♀) have been used here to verify the identity of the species.

The length of forewings for both sexes given in the original description (♂ 20-21 mm; ♀ 26-28 mm) is erroneous as there are no specimens of these dimensions among the material. The correct sizes are given above. The figures of male genitalia apparently were prepared from a cleared preparation, which was later mounted on a microscope slide. However, the slide labelled as *Hydropsyche flynni* holotype contains the abdomen of an unidentified *Anisocentropus* sp. male. New figures are prepared from the specimens collected with the holotype.

The illustrations and description of *Hydropsyche papuana* Kumanski (1979) fully agree with



Figures 12-15, *Hydropsyche flynni* Korboot, topotypes: 12, male genitalia lateral; 13, dorsal; 14, ventral; 15, female genitalia lateral. Figures 16-19, *Abacaria barretti* Korboot, male figures reproduced from Korboot 1964b: 16, male genitalia lateral; 17, dorsal; 18, ventral; 19, paratype female, genitalia lateral. Figures 20-25, *Herbertorossia orakaivai* Kimmins, paratypes of *H. rapsoni* Korboot; 20, male genitalia lateral; 21, phallus lateral; 22, male genitalia dorsal; 23, ventral; 24, female genitalia lateral; 25, dorsal.

specimens of *H. flynni*. *H. papuana* is thus a new synonym.

Distribution. New Guinea (central highlands).

***Abacaria barretti* Korboot**

Figures 16-19

Abacaria barretti Korboot, 1964b: 52, figs. 7-9, 24.

Type material. Holotype ♂, NEW GUINEA: Papua New Guinea, Kundiawa (5°59'S, 145°01'E) 5200 ft (1580 m), 15 Sep 1959, J.H. Barrett (QM T-6191); paratypes 2 ♀ collected with holotype (genitalia preparation PT-1346 figured) (EQU).

No new material is available.

Diagnosis. Male abdominal segment 9 in dorsal view broad, rounded apically, slightly excised mesally; segment 10 short, in lateral view truncate apically, upper apical angles rounded, slightly elevated. Female abdominal segment 9 with lateral cavity elongate oval.

Length of forewing: ♂ 6-7 mm; ♀ 6.5 mm.

Remarks. No part of the microscope preparation labelled as the holotype abdomen corresponds with the published illustrations of male genitalia. Indeed, that abdomen appears to be a female of an unknown species. The type material consists of only three specimens, the holotype male and two paratype females. The presence of other similar species in the same general area makes it necessary to obtain authentic male specimens from the type locality to verify the species identity. Under the present circumstances the original illustrations of the male genitalia (here reproduced) strongly suggest that, irrespective of described differences, *A. barretti* is most likely a synonym of *A. subfusca* Kimmins (1962).

Distribution. New Guinea (central highlands).

***Herbertorossia orakaivai* Kimmins**

Figures 20-25

Herbertorossia orakaivai Kimmins, 1962: 141, fig. 40.

Herbertorossia rapsoni Korboot, 1964b: 52, figs. 10-12, 31 (not 13-15 as stated in description). syn. nov.

Type material. Holotype ♂ of *Herbertorossia orakaivai*, NEW GUINEA: Papua New Guinea, Kokoda (8°52'S, 147°45'E), May 1933, L.E. Cheesman (BMNH); paratypes 10 ♂, 10 ♀, same locality as holotype, L.E. Cheesman, Jul, Sep, Oct 1933 (BMNH). Type not examined.

Holotype ♂ of *Herbertorossia rapsoni*, NEW GUINEA: Papua New Guinea, Minj (5°51'S, 144°40'E) 5200 ft (1580 m), 20 May 1960, J.H. Barrett 1960 (QM T-6190); paratypes 1 ♂ 2 ♀ collected with holotype (genitalia preparations PT-1391 ♂, PT-1392 ♀ figured) (EQU).

Other material examined. NEW GUINEA: 1 ♂, 13 ♀, Minj, 5200 ft, 20 May 1960, J.H. Barrett (EQU).

Diagnosis. Male foreleg tarsal claw enlarged; abdominal segment 9 in dorsal view somewhat triangular, minutely excised apically, lateral lobe small, bluntly triangular; segment 10 in dorsal view broad, apical angles rounded, mesal excavation shallow, broad. Female abdominal segment with lateral cavity broad.

Length of forewing: ♂ 6-7 mm; ♀ 7-8 mm.

Remarks. Re-examination of type material revealed that one of the three paratypes, although labelled as female, is actually a male. The abdomen was cleared and new figures prepared. The holotype body is mounted as a microscope preparation. Although the preparations of both sexes show some small differences, these are not considered sufficient for separating *H. rapsoni* from *H. orakaivai* Kimmins and the species are here synonymised.

Distribution. New Guinea (central highlands).

Polycentropodidae

***Polycentropus kenampi* (Korboot)**

Figures 26-29

Austreclonina kenampi Korboot, 1964b: 48, figs. 19-23, 25 (not 13-15, 23-25 as stated in description).

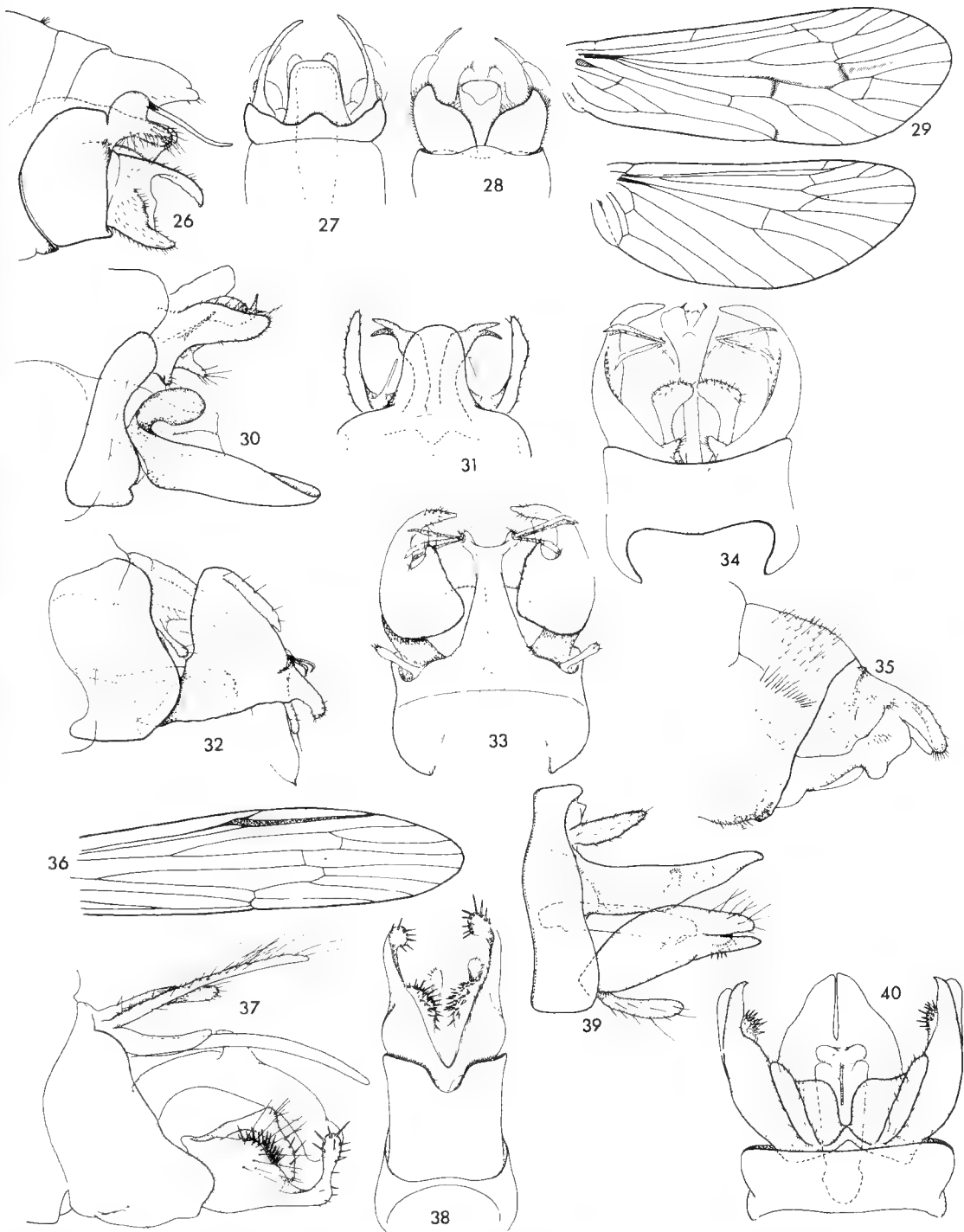
Polycentropus drummondi Illies, 1969: 487, figs. 1-3. syn. nov.

Type material. Holotype ♀ (not ♂) of *Austreclonina kenampi*, NEW GUINEA: Papua New Guinea, Mt. Wilhelm (5°44'S, 145°04'E) 11300 ft (3440 m), 3 Sep 1959, A.M. Rapson (QM T-6188); paratypes 3 ♂ (not ♀ as stated in the description) J.H. Barrett (genitalia preparation PT-1318 figured) (EQU).

Holotype ♂ of *Polycentropus drummondi*, NEW GUINEA: Papua New Guinea, shore of Lake Aunde (5°44'S, 145°04'E) 3600 m, 2 Oct 1966, J. Illies (ANIC); paratype ♀ collected with holotype. Type not examined.

No other material is available.

Diagnosis. Male genitalia with segment 9 semi-membranous, mesal section extended distally into somewhat rectangular lobe, obscuring segment



Figures 26-29, *Polycentropus kenampi* (Korboot), paratype male; 26, genitalia lateral; 27, dorsal; 28, ventral; 29, wing venation. Figures 30, 31, *Polycentropus similis* Kimmins, male from Karimui nr Goroka; 30, genitalia lateral; 31, dorsal. Figures 32-35, *Helicopsyche cochleaetesta* Korboot, specimens from Brisbane area; 32, male genitalia lateral; 33, dorsal; 34, ventral; 35, female genitalia lateral. Figure 36, *Oecetis australis* (Banks), holotype male of *O. situlus* Korboot, portion of forewing. Figures 37, 38, *Triaenodes bernaysae* Korboot, male from Brisbane area; 37, genitalia lateral; 38, ventral. Figures 39, 40, *Symphitoneuria ampla* Korboot, male from Laiagam; 39, genitalia lateral; 40, ventral.

10; upper margin of superior appendage extended into long mesally curved process; inferior appendage short, broad, upper margin forming a curved process.

Length of forewing: ♂ 6.2-6.5 mm; ♀ 6.5 mm.

Remarks. The genus *Austreclonina* with its type species *A. kenampi* originally was placed in the psychomyiid subfamily Paduniellinae. The description, however, is in many respects strange and puzzling, and apparently is based on erroneous count of 6-segmented maxillary palps, 4-segmented labial palps and assumed forked R₁ in forewings.

The re-examination of type material revealed that the holotype is a female, not male as stated in the description, and corresponds to the figures 19-21 which illustrate a female. The three paratypes are all males, not females as described.

The maxillary palp of the holotype is mounted on a microscope slide, segment 5 is sharply twisted at about midway as illustrated in the figure 23 and obviously has been miscounted as two segments. The labial palpi are 3-segmented and there is no fork at the apex of R₁ in forewing. The genus *Austreclonina* has all the characteristics of *Polycentropus* and is here placed into synonymy with it.

The two species, *P. kenampi* and *P. drummondii* are both described from the same general locality; the illustrations of the latter agree so well that it is here placed into synonymy with *P. kenampi*.

Distribution. New Guinea (central highlands).

***Polycentropus similis* Kimmins**

Figures 30, 31

Polycentropus similis Kimmins, 1962: 131 fig. 33.

Polycentropus niger Korboot, 1964b: 49, figs. 16-18, 29 (not 30 as stated in description) syn. nov.

Type material. Holotype ♂ of *Polycentropus similis*, NEW GUINEA: Papua New Guinea, Kokoda 1200 ft (365 m), Jun 1933, L.E. Cheesman (BMNH). Type not examined.

Holotype ♂ of *Polycentropus niger*, NEW GUINEA: Papua New Guinea, Umbra, Mt Hagen 5100 ft (1550 m), 20d Mar 1960, J.H. Barrett (QM T-6192); paratype 1 ♂ same locality, now identified as *Polycentropus mounthageni* Kumanski (EQU); 2 ♀♀ collected with holotype (species identity not confirmed).

Diagnosis. Male abdominal segment 10 elongate, rounded apically, membranous, fused with segment 9; a pair of apically bifid processes arise below the base of segment 10; superior appendages with a thin projection on inner surface; inferior appendages elongate, stout, arched, apically clavate branch meso-basally.

Length of forewing: ♂ 7-7.5 mm; ♀ 7.5 mm.

Remarks. According to the published information the type material of *P. niger* consists of four specimens, the holotype male and three paratype females. Re-examination of this material revealed that one of the paratypes actually is a male of another species, probably *Polycentropus mounthageni* Kumanski. As the female of *P. mounthageni* is unknown and both occur in the same general area, the identity of the two paratype females is placed in doubt. The abdomen of *P. niger* holotype is mounted on a microscope slide restricting the angle of view. The available details agree well with figures of *P. similis* Kimmins and both species are synonymised.

The illustrations of *Polycentropus australis* described by Ulmer (1915) and recorded from three localities of the Sepik river area closely resemble, and may be the same as, *Polycentropus similis* Kimmins. Ulmer's type material consisted of two male and three female specimens which were deposited in the Berlin Museum. Of these, only one female has been located (Etapenberg, 28 Oct 1912) in that collection. Further details on characters and distribution of this species is required to verify its identity and likely synonymy with *Polycentropus similis* Kimmins.

Distribution. New Guinea (central highlands).

Helicopsychidae

***Helicopsyche cochleatista* Korboot**

Figures 32-35

Helicopsyche cochleatista Korboot, 1964a: 34, figs. 20-39.

Type material. Holotype ♂, AUSTRALIA: Queensland, Tamborine Mountains, 1 Dec 1962, K. Korboot (QM T-6173); paratypes 2 ♂♂, 7 ♀♀ (1 ♂, 1 ♀ to Ross), collected with holotype (EQU).

Other material examined. Queensland and New South Wales (numerous localities).

Diagnosis. Male abdominal segment 10 long, curved downwards, abruptly widened apically, three strong spines on either side; inferior appendages in lateral view broadly triangular.

Length of forewing: ♂ 4.5-5 mm; ♀ 4.5-6 mm.

Remarks. The abdomen of the male holotype is mounted on microscope slide in an oblique dorso-ventral position; individual parts could be compared with a cleared paratype, from which new figures were prepared. The paratype material, according to the description, consisted of 11 specimens (5 males, 6 females) in the EQU collection; of these, nine specimens (2 males, 7 females) were available for study, but the remaining two (1 male, 1 female) have been sent some years ago to the late Dr Ross (Schneider, in litt. 1983).

Distribution. Eastern Australia.

Leptoceridae

Oecetis australis (Banks)

Figure 36

Oecetina australis Banks, 1920: 350.

Oecetis australis.-Neboiss, 1978: 840.

Oecetis situlus Korboot, 1964a: 32, figs. 1-9 syn. nov.

Type material. Holotype ♂, *Oecetina australis*, AUSTRALIA: (as New Holland), Melbourne (Victoria), Thorey (ANIC). Type examined.

Holotype ♂, *Oecetis situlus*, AUSTRALIA: Queensland, Cedar Creek, Tamborine Mountains, 5 Sep 1962, K. Korboot (excluding the mounted wings) (QM T-6166); paratype ♂ collected with holotype (QM).

Diagnosis. Male genitalia with inferior appendages in ventral view short, mesally separated by deep V-shaped excision; apico-mesal angle more or less extended distally into a narrow process.

Remarks. The type material consists of two males and one female in individual vials in one glass tube; details are as follows:

Specimen 1-holotype male: head detached, all four wings and the first six abdominal segments are attached to thorax, the tip of abdomen together with genitalia removed and mounted on a microscope slide.

Specimen 2-male: thorax and all wings intact, abdomen removed, cleared in KOH; genitalia partially distorted.

Specimen 3-female: head, thorax and abdomen intact, both left side wings detached. The forewing base section breakage line agrees with corresponding part of mounted wing portion on microscope slide which is erroneously labelled as holotype ♂ wing; hindwing is mounted on a separate slide and labelled "holotype" hindwing. This specimen is not conspecific with *O. situlus* holotype but is now identified as *Oecetis pechana* Mosely.

The details of *O. situlus* holotype genitalia and wing venation agree with *Oecetis australis*. *O. situlus* is here suppressed to synonymy. The larva described in the same paper is not that of *O. situlus* (= *australis*) but is *Notalina fulva* type "A" according to R. St Clair (in litt. 1985).

Distribution. Eastern Australia.

Triaenodes bernaysae Korboot

Figures 37,38

Triaenodes bernaysae Korboot, 1964b: 50, figs. 32-51.

Type material. Holotype ♂, AUSTRALIA: Queensland, Cedar Creek, Tamborine Mountain, 12 Sep 1962, K. Korboot (QM T-6169); paratypes 3 ♂ collected with holotype (QM; EQU).

Other material examined. Queensland: Brisbane, Camp Mountain; New South Wales: Ebor, Dorrigo, Barrington Tops.

Diagnosis. Male abdominal segment 9 narrowed distally, ventral margin with rounded, moderately broad mesal excavation; superior appendages slender; inferior appendages short, basally broad, lower apical angle extended, bent upward as a clavate process, an angular, downward directed process arises on inner surface near base.

Remarks. The original description gives a total of six specimens—the holotype and five paratype males as the type material. Of these the holotype and four paratypes were examined; all but one male paratype are in the Queensland Museum collection. The museum specimens are preserved in alcohol and placed in individual vials labelled I-IV. Details are as follows:

Vial I—complete male specimen, intact.

Vial II—complete male specimen, but abdomen detached.

Vial III—a male of another *Triaenodes* species, specimen with abdomen and right side forewing detached.

Vial IV—holotype, specimen in two sections, but wings attached to the corresponding thoracic segments; the tip of abdomen detached at segment 6 and mounted separately as microscope slide.

The glass tube containing the four vials also has the following labels: "Sp.8/ Bred fr. pupa Tamb. Mt. Q Jan. 1962, K. Korboot/ *Triaenodes* sp. nov. E.F. Riek det. 1962/ *T. bernaysae* ♂ Holotype K. Korboot/ ♂ Holotype T-6169, ♀ paratypes T-6170–T-6172 (holotype abdomen on slide)". It is noted that the published date does not correspond to that on the label, and the three paratypes are registered as females. The paratype male in the Queensland University collection bears the same locality and date as the specimens in the Museum collection.

Distribution. South-eastern Queensland and North-eastern New South Wales.

Symphitoneuria ampla Korboot

Figures 39, 40

Symphitoneuria ampla Korboot, 1964b: 49, figs. 13–15, 28, 30 (not 27 as stated in description).

Symphitoneuria ampla—Illies, 1969: 490, figs. 7–11.

Type material. Holotype ♂, NEW GUINEA: Papua New Guinea, Mt Wilhelm (5°44'S, 145°04'E) 11300 ft (3440 m) at light, 4 Sep 1959, J.H. Barrett (QM T-6187); paratypes 3 ♂ ♂ (not ♀ ♀ as stated in description) collected with holotype (EQU).

Diagnosis. Male forewing with section of veins Rs and M fused along discoidal cell. Abdominal segment 9 narrow, segment 10 in dorsal view gradually widened basally, a deep, narrow slit apico-mesally; both apical branches of the inferior appendages about equal in length.

Length of forewing: ♂ 13.5–15.5 mm; ♀ 15–17 mm.

Remarks. The species was redescribed and new illustrations published by Illies (1969) from specimens collected at Lake Aunde, the same general area as the type material. Although only the male holotype and three male (not female) paratypes are designated, a further 15 males and 13 females

are conspecific and bear the same labels with the same locality and date.

Distribution. New Guinea (central highlands).

Acknowledgments

I would like to acknowledge the advice received many years ago from the late Dr H.H. Ross urging me to undertake this task. I am grateful for the loan of specimens, co-operation and help received from Miss Margaret Schneider of the University of Queensland and Mr E.C. Dahms of the Queensland Museum. I am grateful to Dr T.R. New, La Trobe University, Bundoora and Mr K.L. Walker, Museum of Victoria, Melbourne for their valuable comments and criticism.

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SEROLINA, A NEW GENUS FOR *SEROLIS MINUTA* BEDDARD
(CRUSTACEA: ISOPODA: SEROLIDAE)
WITH DESCRIPTIONS OF EIGHT NEW SPECIES FROM EASTERN AUSTRALIA

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Abstract

Poore, G.C.B., 1987. *Serolina*, a new genus for *Serolis minuta* Beddard (Crustacea: Isopoda: Serolidae) with descriptions of eight new species from eastern Australia. *Mem. Mus. Vict.* 48: 141-189.

A new genus *Serolina* is erected for *Serolis minuta* Beddard, 1884, and 12 other species (*Serolis bakeri* Chilton, 1917, *S. eugeniae* Nordenstam, 1933), and *S. yongei* Hale, 1933; *Serolina acaste*, *S. clarella*, *S. delaria*, *S. granularia*, *S. holia*, *S. kawina*, *S. nepea*, and *S. orriella* spp. nov.) from eastern and south-eastern Australian bays, coast and shelf. *Serolina* is contrasted with *Serolis* whose type species *Serolis fabricii* Leach = *S. paradoxa* (Fabricius) is figured. *Serolina* differs from *Serolis* in the absence of pleonal sternal keels, male pereopod 2 with plumose setae on articles 3-5, male pereopod 7 without plumose setae but often with a modified dactylus, uropods attached proximally, maxilla 2 with 1 seta on the medial lobe of third endite, female without an antennal notch and coxal keys absent.

A key to the identification of the eastern Australian species is presented.

Introduction

The isopod family Serolidae is widespread in shallow sandy marine habitats and in the deep sea particularly in the Southern Hemisphere. There are about 65 species which, apart from one, *Basserolis kimblae* Poore, are superficially quite similar.

Sheppard (1933) described in detail the morphology of all species of *Serolis* then known, and Nordenstam (1933) attempted to divide them into subgenera. His subgenera (*Homoserolis*, *Heteroserolis*, *Serolis* Leach and *Spiniserolis*) have not stood the test of time and fortunately are unavailable under provisions of ICZN Article 13(b). More recently new names have been introduced for small groups of species from limited geographic areas. The genus *Glabroserolis* Menzies, 1962, was erected for a species from the South Atlantic. Cals (1977) proposed "Ceratoserolis" for seven Antarctic species and in 1982 grouped two deepwater Atlantic species in "Atlantoserolis". No type species was designated for either of Cal's "genera" and the names must therefore also be considered unavailable. Harrison and Poore (1984) discussed the validity of these genera and

Poore (1985) compared *Basserolis* with *Serolis* s.l. The subgenus *Serolella*, introduced by Pfeffer (1891) for *Serolis pagenstecheri* Pfeffer, has been overlooked by all subsequent authors. Its value remains to be investigated.

This contribution deals with 13 species of Serolidae of which some were previously recognised as the *Serolis-minuta* group (Monod, 1971; Holdich and Harrison, 1980; Harrison and Poore, 1984). It is my view that these species comprise a distinct genus which is here contrasted with *Serolis paradoxa* (Fabricius), senior objective synonym of the type species of *Serolis* (*Serolis fabricii* Leach), and with other species groups of the *Serolis* complex. Among these groups are: *S. australiensis* and its Australian relatives (Harrison and Poore, 1984); *S. paradoxa* and its South Atlantic relatives; Cal's Antarctic "Ceratoserolis"; Cal's Atlantic "Atlantoserolis"; and *S. bromleyana* and relatives from the South Pacific. It is not the intention of this contribution to diagnose these probable serolid genera.

That the *S. minuta* group differ consistently from *S. paradoxa* is sufficient argument to describe these species within a separate genus. As

far as is known *Serolina* contains only Australian species. This paper deals with species from extensive collections in eastern and south-eastern Australia, from Queensland, New South Wales, Victoria, Tasmania and South Australia. Collections taken more recently from the North-west shelf of Western Australia contain more species of *Serolina*. The characters distinguishing the new genus *Serolina* are essentially those used by Harrison and Poore (1984) to contrast the *Serolis-minuta* group with other Australian shelf species and those used to distinguish *Basserolis* (Poore, 1985). The diagnosis is sufficiently detailed to anticipate the diagnoses of suspected serolid "genera".

Morphological variation within the *Serolis-minuta* group was first discussed by Monod (1971) and elaborated by Holdich and Harrison (1980). These authors looked at only dorsal sculpture, a sexually dimorphic and otherwise variable character, and were unable to decide on specific morphological limits. By examining more characters, particularly in limbs of adult males, it is shown here that several species co-exist on the eastern Australian coast and that the sculpture of each is specific.

Materials and methods

Much of the material on which this study is based has come from large benthic surveys of the bays and shelf of eastern Australia:

Bass Strait Survey, 1979-1985 (BSS) carried out by the Museum of Victoria, Melbourne;

Crib Point Benthic Survey, 1965-1972 (CPBS) and Westernport Bay Environmental Study, 1973-1974 (WBES), both carried out in Western Port, Victoria, by the Marine Studies Group, Ministry for Conservation, Melbourne;

Port Phillip Bay Environmental Study, 1969-1973 (PPBES), carried out in Port Phillip Bay, Victoria, by the same group;

Shelf Benthic Survey, 1973 (AMSBS) and Hunter District Water Board Survey, 1975-6 (HDWBS) carried out on the New South Wales shelf by the Australian Museum, Sydney. Wilson and Poore (in press) list station localities for the Bass Strait Survey and Poore (1986) did the same for Crib Point, Westernport and Port Phillip Bay studies.

All material is lodged in the collections of the Museum of Victoria, Melbourne (NMV), Australian Museum, Sydney (AM), Queensland Museum, Brisbane (QM), South Australian Museum, Adelaide (SAM), Tasmanian Museum and Art Gallery, Hobart (TM), British Museum (Natural History), London (BMNH), Swedish Museum of Natural History, Stockholm (SMNH), Los Angeles County Museum of Natural History, Los Angeles (LACM), and United States National Museum of Natural History, Washington (USNM).

The scale on all figures refers only to whole animals and is 1 mm. Illustration labels are abbreviated thus: A1, A2, antennae 1 and 2; MD, mandible; MX1, MX2, maxillae 1 and 2; MP and MPp, maxilliped and its palp; P1-P7, pereopods 1 to 7; PL1-PL5, pleopods 1 to 5 with representative setae only; U, uropod; V, pleonal sternites 1 to 3; X and Y are explained in each caption; l, left; r, right. Illustrations marked a are of the male holotype, b of a female paratype, unless otherwise noted.

A new terminology is introduced to describe dorsal sculpture. *Mid-dorsal* crests or tubercles are common on the head, pereonites, pleonites and pleotelson. On pereonites at the base of the coxae and on pleonites are *lateral* ridges or lobes. In females the posterior margin of pereonite 2 is often expanded posteriorly at the base of the coxa as a *lateral marginal* lobe. The *midlateral marginal* crenulations extend along a ridge between the mid-dorsal crest and the lateral lobe.

Leach (1818) and later the name *Serolis trilobitoides* Eights drew attention to the similarity of serolids to trilobites. The specific epithets of the new species described here are genera of trilobites chosen only for their euphony, not to reflect any specific features of either the isopod or the trilobite.

Serolina gen. nov.

Diagnosis. Serolidae markedly flattened, unable to conglobate, coxal plates laterally extended, without interlocking keys; male broader than female. Head with a median posterior tubercle and sometimes with 1 or 2 pairs of smaller tubercles. Pereonite 5, in dorsal midline, longer than half length of pereonite 4. Pleon telson apex rounded

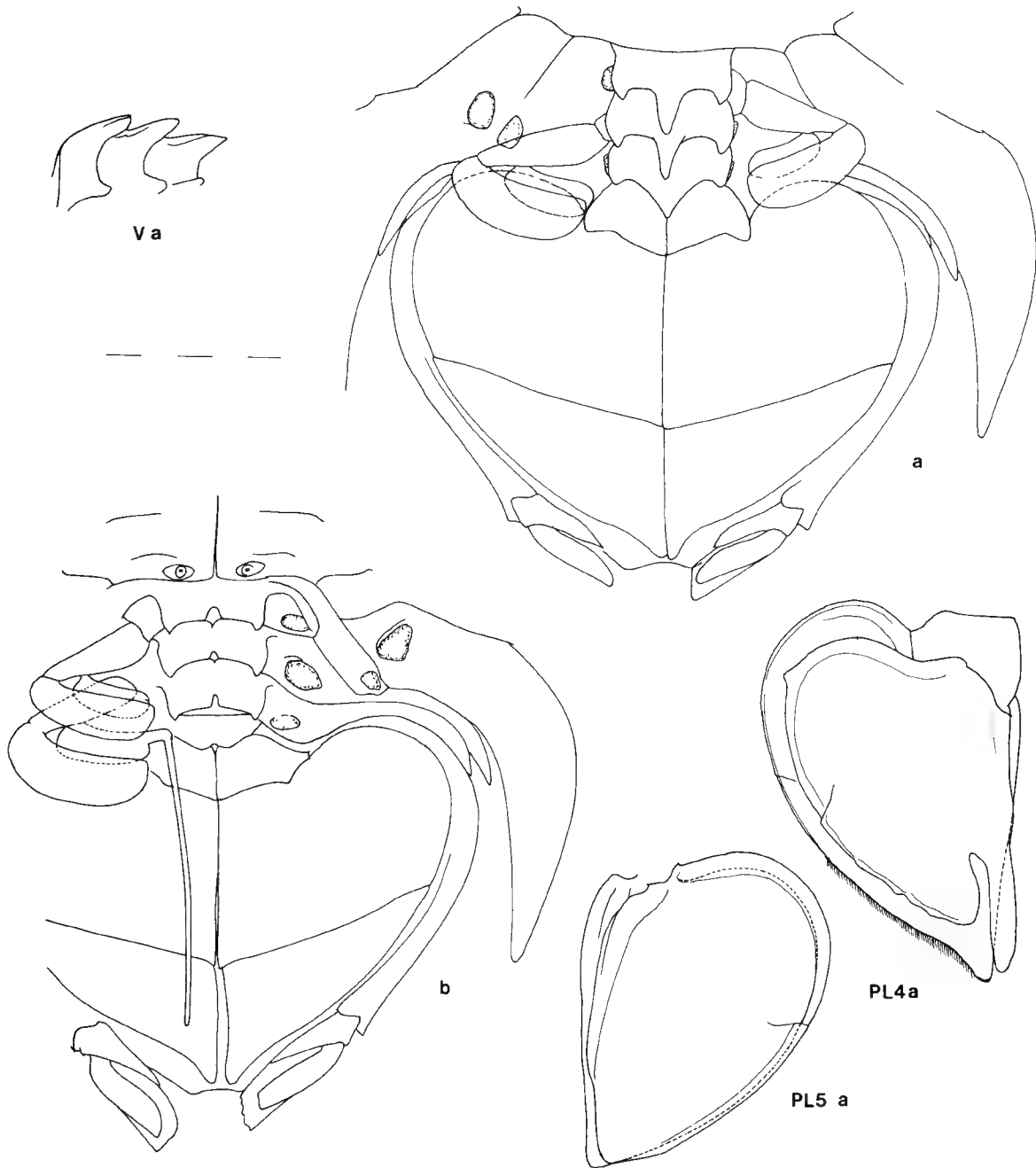


Figure 1. *Serolis paradoxa*. a, female, 36 mm; b, male, 32 mm (BMNH 1868:62). Ventral view of female pleon shows points of attachment of right pereopods 6 and 7, right pleopods 1 and 3, and left pleopods 2 and 3 (right pleopods 2 and 4 and left pleopods 1 and 4 are shown). Ventral view of male pleon shows points of attachment of left pereopods 6 and 7, left pleopods 1- 3 (right pleopods 1, 2 and 4, and left pleopod 4 are shown).

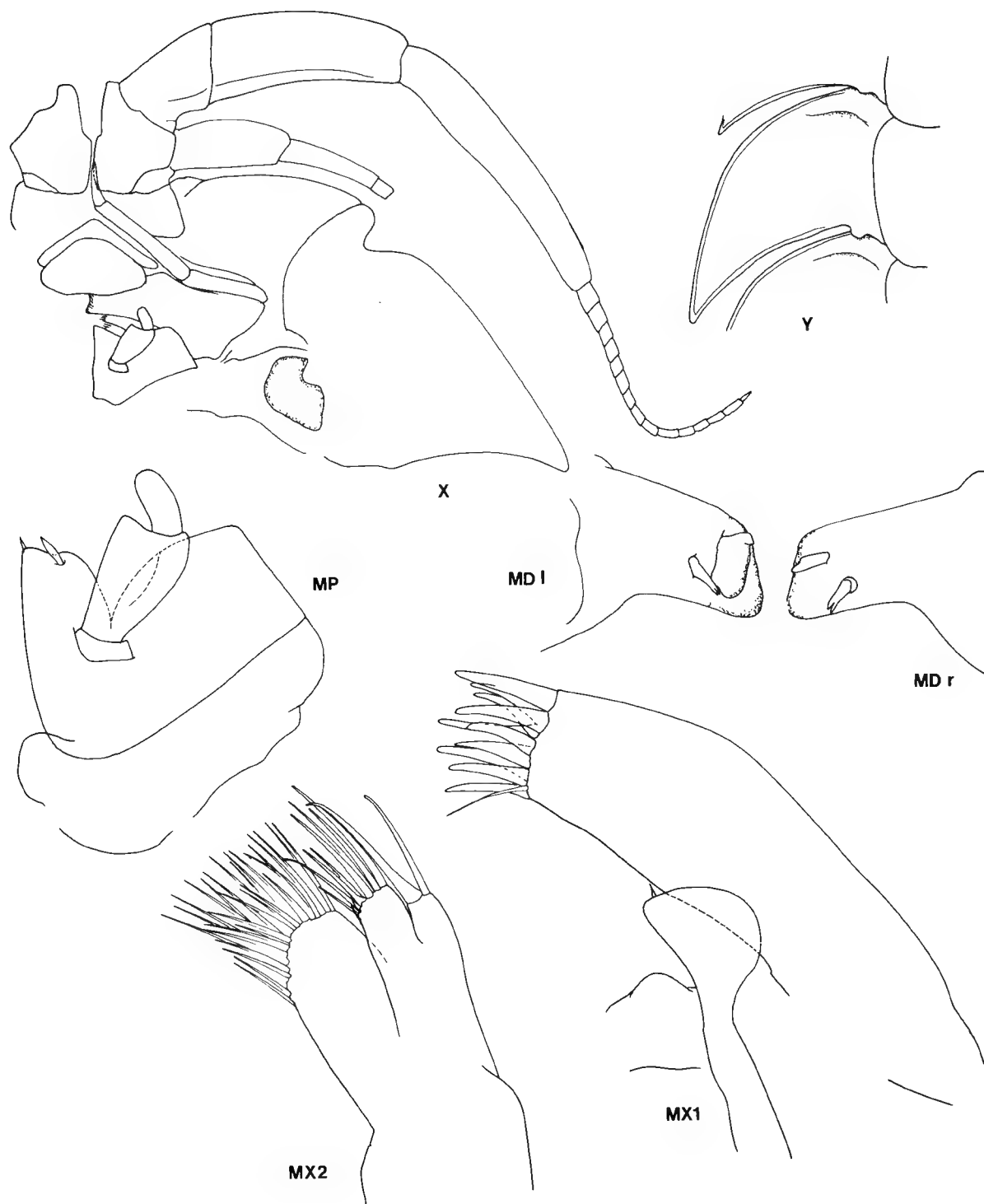


Figure 2. *Serolis paradoxa*. a, female, 36 mm; b, male, 32 mm (BMNH 1868:62). X, ventral view of left side of head and pereonite 1. Y, ventral view of coxa 3.

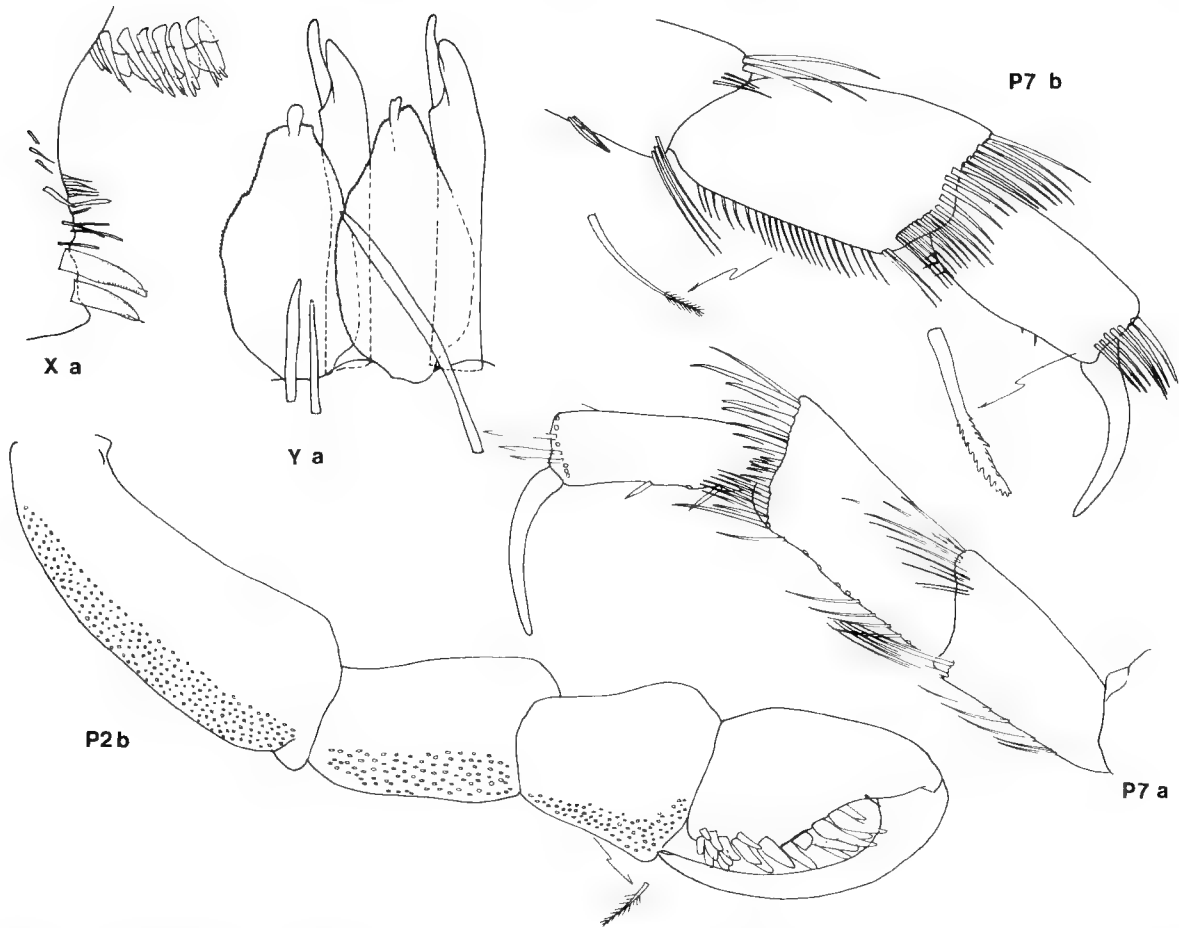


Figure 3. *Serolis paradoxa*. a, female, 36 mm; b, male, 32 mm (BMNH 1868:62). X, medial view of carpal thumb of left pereopod 1. Y, lateral view of propodal palm of left pereopod 1.

or truncate. Pleonal sternites 1-3 not markedly keeled in either sex; sternite 1 lacking median posterior projection.

Antenna 1 not sexually dimorphic.

Mandible: left lacinia mobilis a broad serrate blade, at least two-thirds width of incisor, much wider than right lacinia mobilis. Maxilla 1 with 11 spines on outer ramus. Maxilla 2 with simple setose second endite, and bilobed third endite with 1+2 setae. Maxillipedal palp of 3 articles; article 2 with lateral margin slightly concave proximally, broadening distally.

Pereopod 1 article 6 with lateral row of setae plus row of flattened spines and row of bifid spines along cutting edge. Pereopod 2 sexually dimorphic; in male articles 3-5 without strong spines; articles 4 and 5 with long plumose setae along posterior margin; article 6 with series of

curved spines; dactylus with prominent unguis. Some or all of pereopods 5-7 variously sexually dimorphic; pereopod 7 article 6 of male broader than in female, dactylus hooked or reflexed or sometimes otherwise modified.

Pleopods 1-3 each with elongate laterally-directed peduncle and subelliptical single-articled rami. Pleopod 4 with simple endopod. Uropod with 2 rami, outer shorter, with few setae, attached near base of pleotelson.

Type species. *Serolis minuta* Beddard, 1884.

Etymology. A diminutive of *Serolis* (feminine). (*Serolis* is a made-up name which has always been treated as feminine.)

Remarks. Male and female specimens of *Serolis paradoxa* (Fabricius) from the Straits of Magel-

lan, (BMNH 1868:62) were examined and figures necessary for contrasting *Serolina* are presented here (Figs. 1-3). Sheppard (1933) has also figured parts of this species. The figures of *Serolina minuta* (Figs. 28-30) are the most complete of all the species described here and may be taken as typical of *Serolina*.

The most obvious differences between *Serolis* and *Serolina* are in the pleonal sternites, male pereopods 2 and 7, maxilla 2, pleopod 4, uropods, female pereonite notch and coxal keys. In *Serolis paradoxa* sternal keels are present on pleonal sternites 1-3 of females only; in males the sternites are quite flat in profile (absent in both sexes in *Serolina*). The male pereopod 2 of *Serolis* bears a felt of plumose setae on articles 3-5 (articles 4 and 5 only in *Serolina*). The male pereopod 7 of *Serolis* has a felt of plumose setae on article 5 (absent in *Serolina*); other pereopods are not modified as in *Serolina*. The proximal (medial) lobe of the third endite of maxilla 2 bears 8 long setae in *Serolis paradoxa* (only one in *Serolina*). Pleopod 4 of *S. paradoxa* has a digitate endopodal lobe (not found in *Serolina*). The uropods of *Serolis* are attached distally (proximally in *Serolina*). Females of *S. paradoxa* possess a notch on pereonite 1 (absent in *Serolina*). There are small coxal keys in *Serolis*, smaller than found in "*Ceratoserolis*" (absent in *Serolina*).

Serolina shares with *Serolis*, and differs from other species groups: male broader than female; head with median posterior projection; antenna 1 not sexually dimorphic; similar mandibles; and modified male pereopod 7.

Species of *Serolina* can be distinguished on dorsal sculpture and the key relies largely on this feature. Because of strong sexual dimorphism males are more readily identified than females especially using the shape of terminal articles of pereopods 2 and 7.

Serolina acaste sp. nov.

Figures 4-6

Serolis minuta.—Poore et al., 1975: 33, 64. (not *Serolis minuta* Beddard, 1884)

Material examined. Holotype. Vic. Bass Strait, S of Cape Otway (39°06.0'S, 143°35.8'E), 95 m, fine sand, epibenthic sled, G. Poore et al. on FRV "Hai Kung", 31 Jan 1981 (BSS stn 118), NMV J6172 (♂, 5.6 mm, with 1 slide).

Paratypes. Type locality, NMV J6171 (♀, 6.1 mm), NMV J6501 (2 ♂♂, 4.9-5.1 mm), NMV J6502 (9 ♀♀, 5.4-6.1 mm), NMV J6503 (18 juveniles, 2.7-5.0 mm). Bass Strait, S of Cape Otway (39°06.7'S, 143°28.7'E), 92 m, fine sand, epibenthic sled, G. Poore et al. on FRV "Hai Kung", 31 Jan 1981 (BSS stn 119), NMV J6504 (2 ♂♂, 1 ♀), NMV J6505 (37 juveniles), USNM 221526 (1 ♂, 1 juvenile), LACM 3003 (1 ♂, 1 juvenile); SW. of Cape Otway (39°01.0'S, 143°22.1'E), 84 m, sand, epibenthic sled, G. Poore et al. on FRV "Hai Kung", 31 Jan 1981 (BSS stn 120), AM P34790 (4 ♂♂), AM P34789 (7 ♀♀), AM P34788 (30 juveniles).

Other material. SA. Corny Point (34°55'S, 137°05'E), 1 m, sand and *Posidonia*, G.C.B. Poore and H.M. Lew Ton, 17 Mar 1985 (stn SA23), NMV J11923(23). Flinders Is., NW coast beach (33°41.7'S, 134°28.5'E), 3 m, sand and *Posidonia*, G.C.B. Poore, 19 Apr 1985, (stns SA59 and SA60), NMV J11924(1), J11925(11). Venus Bay, off township (33°13.8'S, 134°40.1'E), 2-3 m, sand in channel and flat, G.C.B. Poore, 23 Apr 1985, (stns SA86 and SA87), NMV J11926(4), J11927 (♂, 5.4 mm; ♀, 6.9 mm).

Bass Strait, eastern and western regions, 16-101 m: 3 ♂♂, 4 ♀♀, 23 juveniles from BSS stations 107, 108, 110, 111, 121, 165, 172, 184 and 190, NMV J6506-J6510, J6554, J6760, J6761, J6774, J6795, J7414.

Vic. Port Phillip Bay, 4 ♂♂, 1 ♀, 4 juveniles from PPBS stations 945, 974 and 984, NMV J6511-J6513.

Tas. Forestier Peninsula, Lagoon Bay, 16 m, TM G2537 (1 ♂, 1 ♀). Off Little Swanport, 10 m, TM G2538 (1 ♀, 3 juveniles). Wineglass Bay, 20 m, TM G2539 (1 manca). Orford, off Spring Beach, 20 m, TM G2540 (1 ♂, 1 juvenile). 15 km E of South Bruny Is. (43°24.6'S, 147°32.5'E), 82 m, epibenthic sled, R. Wilson on RV "Soela", 22 Oct 1984 (BSS stn 232), NMV J11955(2).

Description. Male. Body as long as wide. Coxae 1-3 only just overlapping anterior margins of following coxae; coxae 4-6 evenly spaced, with triangular fissure between each; coxa 6 extending as far posteriorly as pleonal epimeron 3, separated from pleonite 2 by broad triangular fissure.

Head with medial triangular projection and obscure blunt rounded lobes laterally on posterior margin; eye prominent, reniform, with slight medioposterior cave. Pereonites 1-5 and pleonites 1-3 with narrow elongate mid-dorsal crests ending acutely posteriorly, longest and most obvious on pleonite 1. No lateral sculpture on pereon and pleon. Pleotelson lateral margins slightly concave posteriorly, apex subacute; with of long sharp mid-dorsal crest, highest anteriorly.

Antenna 1 article 2 2.8 times as long as wide, distal margin oblique; article 3 0.7 times length of article 2, slightly tapering; article 4 0.5 times length of article 3; flagellum of 9 articles, last 2 minute. Antenna 2 article 4 evenly tapering; article 5 1.6 times length of article 4, 4.8 times as

Key to eastern Australian species of *Serolina*

Serolina holia appears twice because of sexual differences in dorsal sculpture. The key relies almost entirely on dorsal sculpture because this will accommodate identification of both sexes. Males are best confirmed by comparing pereopods 2, 5, 6, and 7 with figures.

1. Mid-dorsal crests visible in lateral view; usually with lateral sculpture and telsonic keel 2
 - No mid-dorsal crests visible in lateral view; no lateral sculpture (or mid-dorsal crests suggested only posteriorly); no telsonic keel 8
2. Lateral sculpture (ridges or lobes) on pereonites near coxal sutures 3
 - No lateral sculpture on pereonites (except a lateral marginal lobe on pereonite 2 of some females) 6
3. Pleotelson with dorsolateral ridges; male with a prominent mid-dorsal head tubercle 4
 - Pleotelson without dorsolateral ridges; mid-dorsal head and pereonite crests of both sexes of even height 5
4. Lateral lobes on pereonites 5 and 6; no midlateral denticles *S. eugeniae* (Figs. 15-17)
 - No lateral lobes on pereonites 5 and 6; with few midlateral denticles *S. nepea* (Figs. 29-31)
5. Head with 3 posterior lobes separated by narrow notches; with midlateral denticles *S. delaria* (Figs. 12-14)
 - Head with insignificant lateral lobes on posterior margin; without midlateral marginal denticles *S. minuta* (Figs. 26-28)
6. Pleotelson with dorsolateral ridges; head with 5 posterior lobes *S. clarella* (Figs. 9-11)
 - Pleotelson without dorsolateral ridges; head with 3 at most posterior lobes 7
7. Coxa 6 acute, reaching pleonal epimeron 2; without lobes on anterior surface of head *S. acaste* (Figs. 4-6)
 - Coxa 6 obtuse, not reaching pleonal epimeron 2; with 2 flat lobes on anterior surface of head *S. holia* (Figs. 20-22)
8. Antenna 1 article 3 shorter than article 4 *S. yongei* (Figs. 35-37)
 - Antenna 1 article 3 longer than article 4 9
9. Coxa 6 narrow and acute, overlapping at least pleonal epimeron 2, disrupting continuity of lateral margin 10
 - Coxa 6 broad and obtuse, not reaching pleonal epimeron 2, scarcely disrupting continuity of lateral margin 12
10. Coxal margins continuous; uropodal exopod much shorter than endopod 11
 - Posterior coxal margins diverge; uropodal exopod little shorter than endopod *S. bakeri* (Figs. 7, 8)
11. Coxa 6 overlapping pleonal epimeron 3 *S. kawina* (Figs. 23-25)
 - Coxa 6 not overlapping pleonal epimeron 2 *Serolina* sp.
12. Antenna 1 article 4 two-thirds length of article 3; uropodal exopod rounded *S. holia* (Figs. 20-22)
 - Antenna 1 article 4 one-third length of article 3; uropodal exopod truncate 13
13. Pleotelson with dorsolateral ridges; uropodal exopod half as long as endopod *S. granularia* (Figs. 18, 19)
 - Pleotelson without dorsolateral ridges; uropodal exopod longer than half length of endopod *S. orriella* (Figs. 32-34)

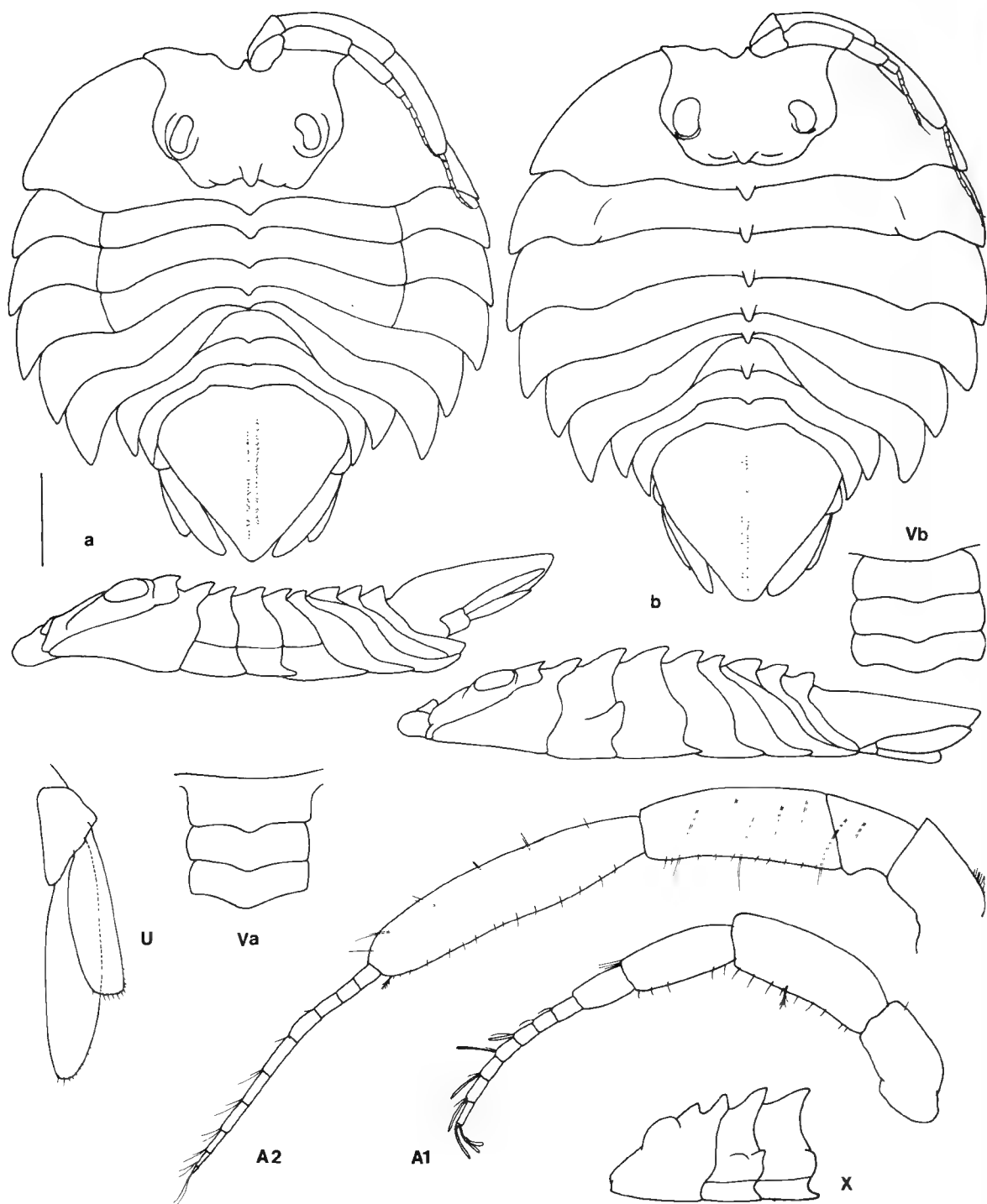


Figure 4. *Serolina acaste*. a, male holotype, 5.6 mm; b, female paratype, 6.1 mm; X, illustrating left lateral boss and marginal lateral flange of pereonite 2, female, 5.0 mm, NMV J11955.

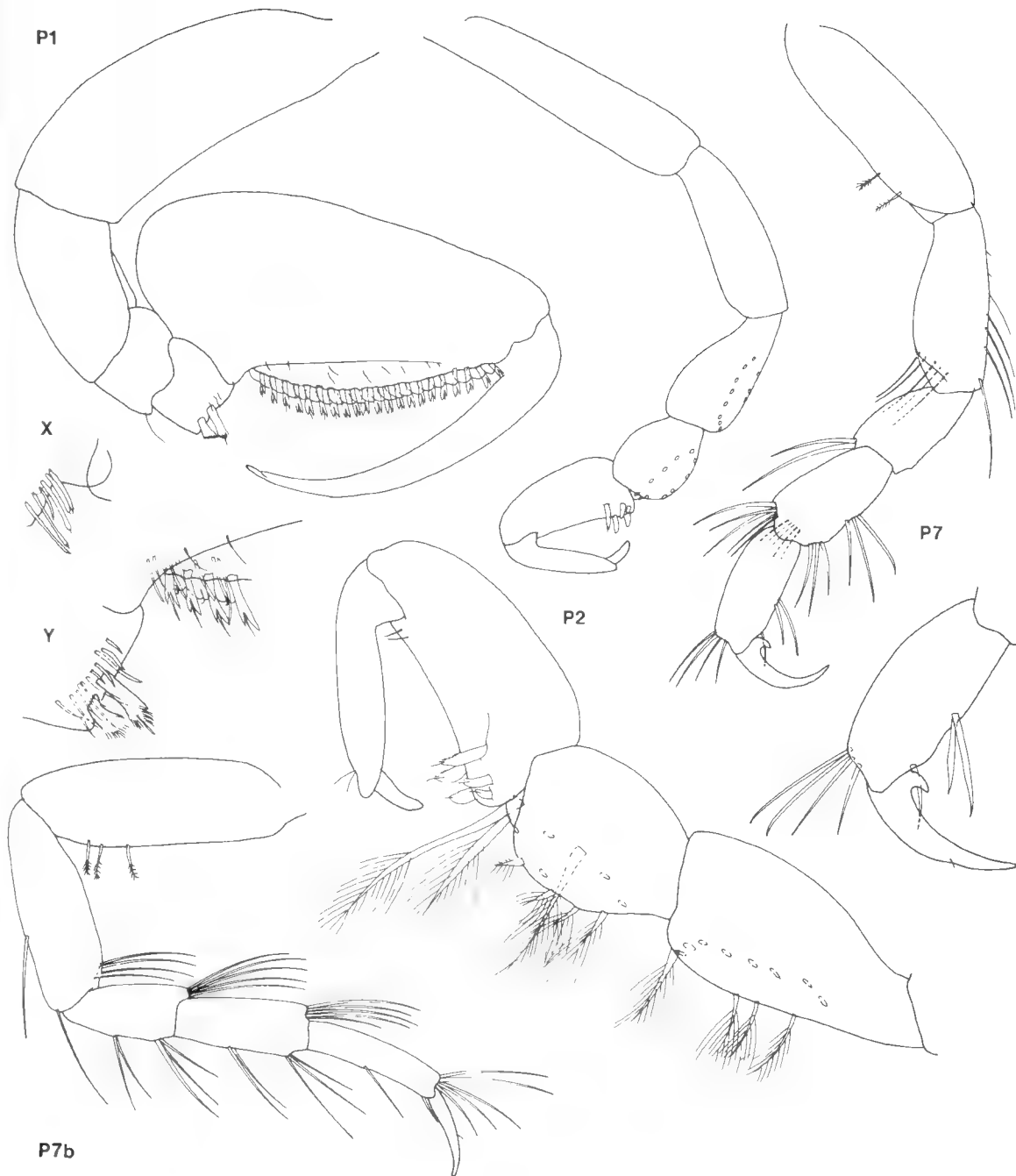


Figure 5. *Serolina acaste*. a, male holotype, 5.6 mm; b, female paratype, 6.1 mm; X, pereopod 1, article 5, lateral view; Y, pereopod 1, article 5 and palm of article 6, medial view.

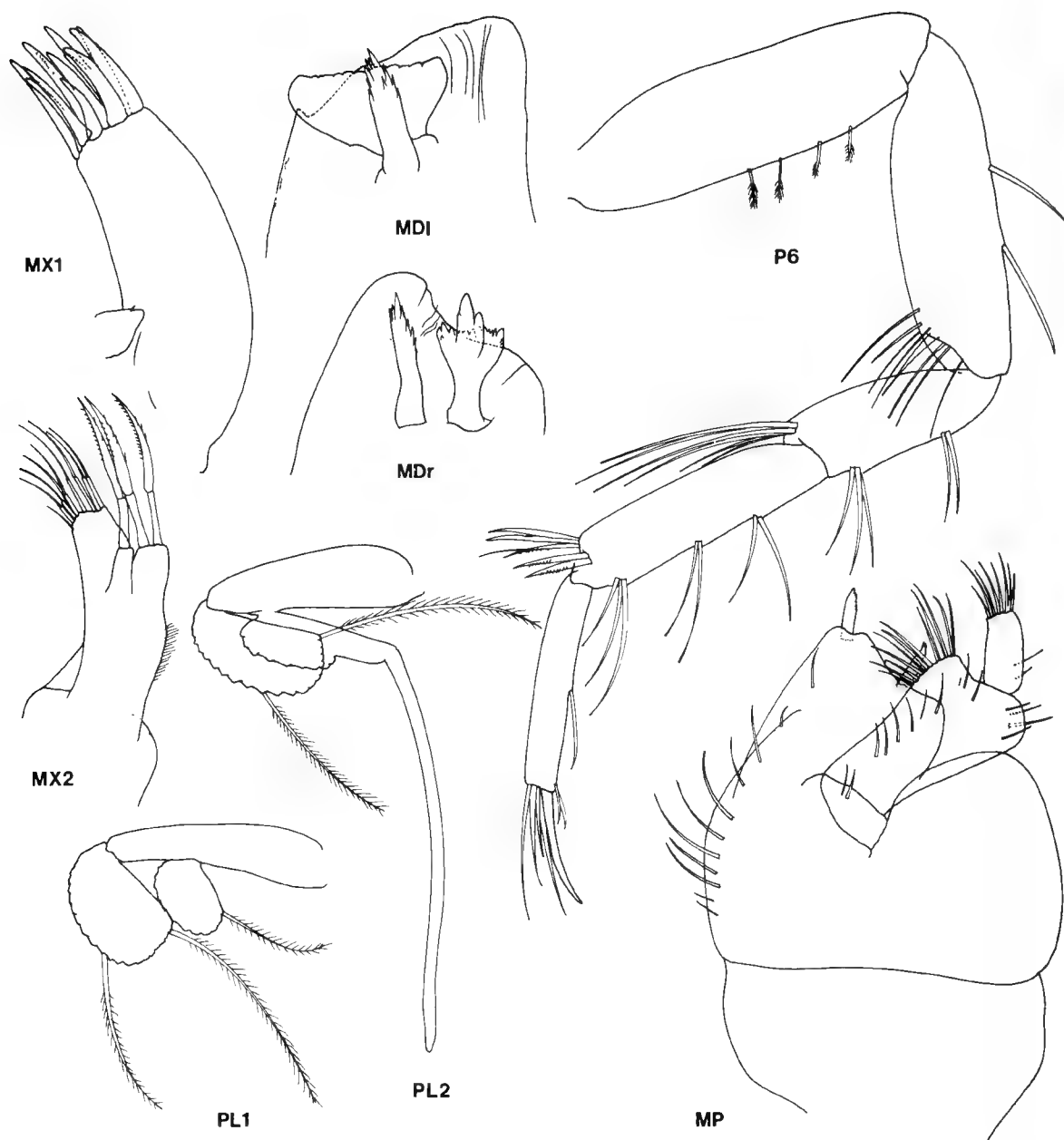


Figure 6. *Serolina acaste*, male holotype, 5.6 mm.

long as wide, tapering slightly over distal two-thirds; flagellum of 10 articles.

Pereopod 2 article 3 shorter than article 2; article 4 with 12 plumose setae in 2 rows; article 5 0.7 times length of article 4, posterior margin distally lobed, with 12 plumose setae in 2 rows; article 6 tapering distally, posterior margin con-

cave, with 5 spines on proximal heel; dactylus unguis attached subapically, about one-fifth of whole length. Pereopod 6 articles 3-6 with anterodistal rows of 6-8 setae and single setae and groups of setae along posterior margin; article 5 3.8 times as long as wide. Pereopod 7 articles 3-5 subquadrate-linear, with anterodistal clusters

of setae; article 6 widest at midpoint, with pair of setae at midpoint and 1 distally on convex posterior margin; dactylus curved, with short proximal thumb.

Pleopod 2 appendix masculina 3.3 times length of endopod. Uropod endopod elongate-ovate, apex narrowly rounded; exopod 0.7 times length of endopod, sub-truncate, with short apical setae.

Female. Body 1.2 times as long as wide. Coxae and pleonal epimera as in male, coxa 6 extending as far posteriorly as epimeron 2. Mid-dorsal sculpture similar to that of male, body deeper. Pereonite 2 with marginal lateral lobes, broadly rounded and upturned, sometimes divided into lobe and denticle (Fig. 4x) and often a lateral boss.

Pereopod 6 similar to that of male. Pereopod 7 basal articles similar to those of male; article 5 more elongate; article 6 much more elongate and with single mid-posterior seta; dactylus fine and without basal thumb.

Distribution. Victoria (Port Phillip Bay), Bass Strait, Tasmania, South Australia; 16-101 m.

Remarks. *Serolina acaste* is a species frequently found on sandy sediments in south-eastern Australia. The species is distinguished by the strong even mid-dorsal crests and absence of lateral sculpture. The proximal thumb on the dactylus of the male pereopod 7 is similar to that found in *S. bakeri* but the latter is dorsally much smoother than *S. acaste*.

Specimens from South Australia differ slightly from those from more eastern states. The head has three posterior denticles rather than lobes, and the uropodal exopod is almost as long as the endopod rather than much shorter. The South Australian male pereopod 2 has more palmar spines than the male from Victoria and the female marginal lateral lobe is more acute. Females reach 6.1 mm and males 5.1 mm in length.

Serolina bakeri (Chilton) comb. nov.

Figures 7, 8

Serolis bakeri Chilton 1917: 394, 398-400, figs. 12-14.—Hale, 1929: 307, 310.—Sheppard, 1933: 333, 336.—Holdich & Harrison, 1980: 377-384, figs. 4C, 4D, 5D.—Harrison & Poore, 1984: 13, 15.

Serolis (Homoserolis) minuta var. *bakeri*.—Nordenstam,

1933: 39, 84, 95.

Serolis minuta.—Dorsey & Synott, 1980: 159. (not *Serolis minuta* Beddard, 1884)

Material examined. Syntypes. SA. Encounter Bay (35°35'S, 138°45'E), 36-54 m, J.C. Verco, SAM C383 (♂, 5.5 mm, with 1 slide); SAM C384 (ovigerous ♀, 6.3 mm; non-ovigerous ♀, 5.2 mm; juvenile, 5.5 mm).

Other material. Vic. McGaurans Beach, Seaspray, 900 m offshore (38°23'S, 147°11'E), 10.5 m, sand, SCUBA, J. Watson et al., 26 Apr 1981, NMV J6797 (non-ovigerous ♀, 4.4 mm, with 2 slides). Breamlea (38°18'S, 144°24'E), 14 m, fine sand, J. Dorsey, 10 Nov 1978, NMV J6798 (3 post-mancas, 2.2-3.2 mm). Breamlea, depth and sediment not recorded, Geelong and Region Water Board, 1986, NMV J14006 (♂, 5.8 mm, 1 slide), NMV J14007 (♀, 5.5 mm, 1 slide), NMV J14008 (2 ♂♂, 3 ♀♀, 3 juveniles).

Description. Male. Body as wide as long. Anterior margins of coxae 2-6 well overlapped by preceding coxae, especially posteriorly, posterodistal corners acute; coxa 6 overlapping pleonal epimera 2 and 3, a deep fissure between each; pleonal epimera 2 and 3 narrow and acute; coxae and epimera fringed with long setae.

Head with 3 flat lobes on posterior margin, medial one more acute than lateral pair; separated from eyes by deep furrow. Eye oval-reniform. Pereonites 1-5 and pleonites 1-3 without mid-dorsal tuberculation or with minute tubercles in Victorian individuals. Pereonites without lateral sculpture. Pleotelson triangular, lateral margin concave distally, apex acute-rounded; with low broad mid-dorsal crest of even height.

Antenna 1 article 2 2.9 times as long as wide, posterodistal corner slightly produced; article 3 0.6 times length of article 2, tapering only over distal two-thirds. Antenna 2 article 4 only slightly tapering over most of length, apically rounded; article 5 1.6 times length of article 4, about 5 times as long as wide, only slightly tapering; flagellum of about 9 articles.

Pereopod 2 articles 2 and 3 elongate; article 4 with 5-10 plumose setae; article 5 0.4 times length of article 4, posterior margin convex, with about 14 plumose setae in 2 rows; article 6 strongly tapering distally, posterior margin sinuous, with 2 rows of 4 spines on proximal two-thirds; dactylus unguis attached near midpoint, about half of whole length. Pereopod 6 article 3 with dense row of setae posteriorly and group of 3-6 setae posteriorly; article 5 3 times as long as wide. Pereopod 7 articles 3-5 broad; article 3 with numerous posterior and anterodistal setae

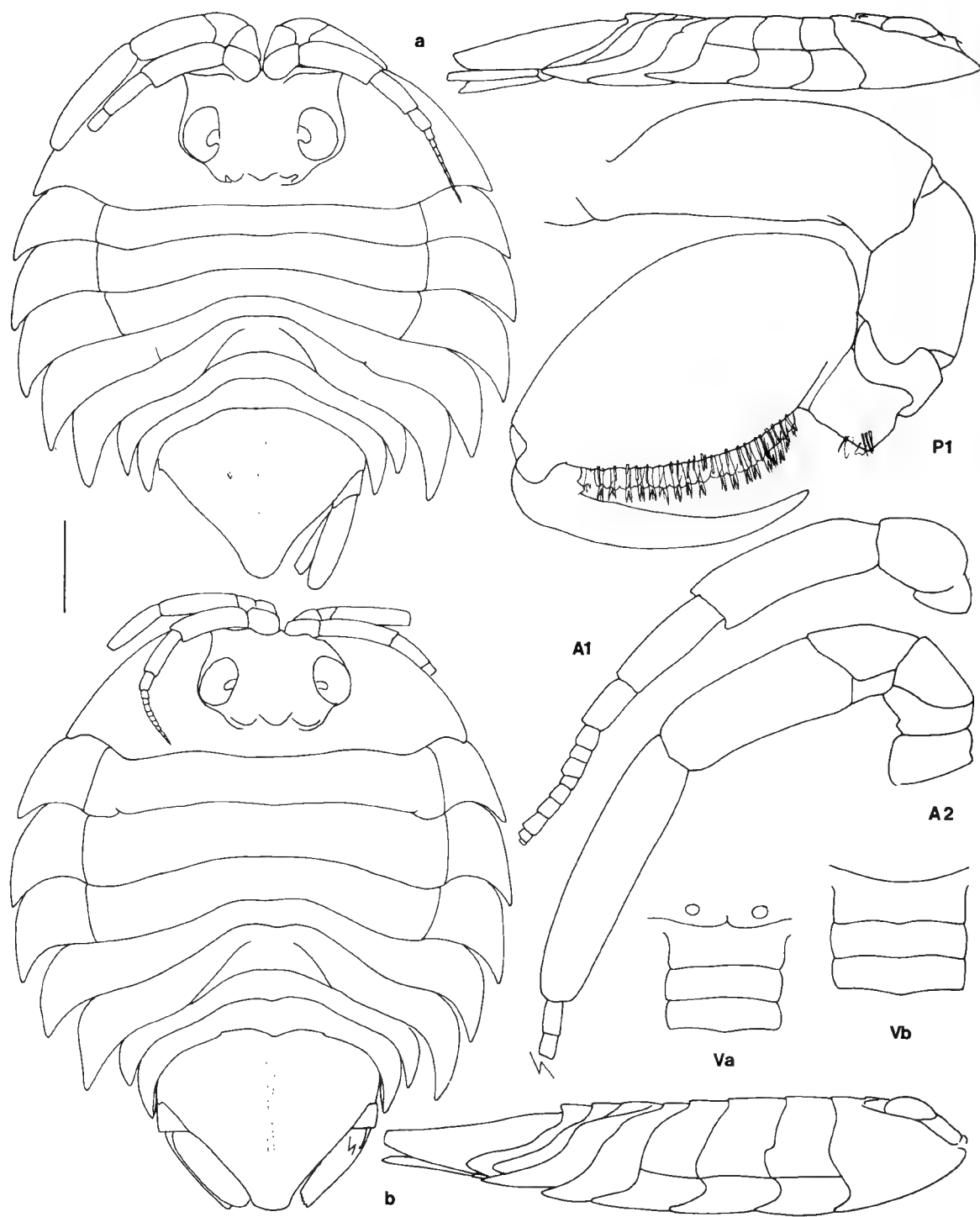


Figure 7. *Serolina bakeri*. a, male holotype, 5.5 mm; b, female paratype, 6.3 mm.

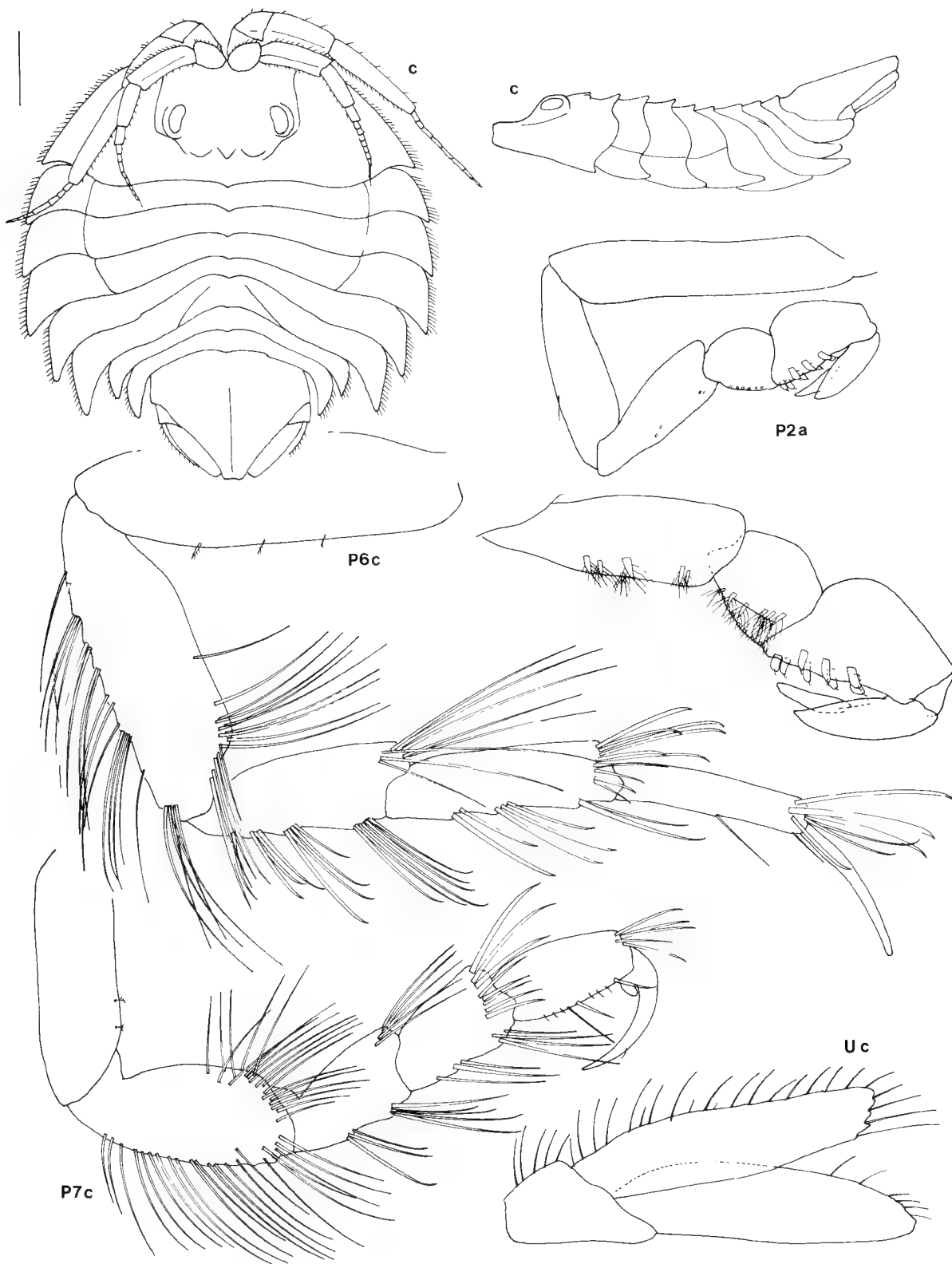


Figure 8. *Serolina bakeri*, a, male holotype, 5.5 mm. c, male, 5.7 mm (NMV J14006).

(posterior setae only on figured type); articles 4 and 5 with anterodistal rows of 3 setae; article 6 broadest proximally and tapering, 3 long setae at midlength of sinuous posterior margin; dactylus curved, with a basal thumb.

Uropod endopod tapering to obliquely truncate apex, with terminal setae; exopod narrower than endopod, widest distally, apex oblique, serrate, with terminal setae.

Female. Body 1.15 times as long as wide. Anterior margin of coxa 2 overlapping coxa 1, anterior margins of coxae 3-6 overlapped by preceding coxae, especially posteriorly, posterodistal corners acute; coxa 6 reaches just beyond pleonal epimeron 3.

Dorsal sculpture of head, pereon and pleon as in male except on pereonite 2. Pereonite 2 with lateral lobe on posterior margin.

Pereopod 6 similar to that of male but without anterior setae on article 3. Pereopod 7 basal articles similar to those of male; article 5 more elongate; article 6 much more elongate and with single mid-posterior seta; dactylus fine and without basal thumb.

Distribution. South Australia and Victoria, 10-54 m.

Remarks. *Serolina bakeri* was previously known only from the type specimens. Most setae have been lost but the specimens are sufficiently intact to characterise. Mouthparts were not completely dissected. The species is best recognised by the very long posterior coxae. The Victorian specimens are characterised by the fringes of long setae on the coxae and epimera, not seen elsewhere in the genus. The dactylus of the male pereopod 7 is similar to that of *S. acaste* but this species has a shorter uropodal exopod.

Serolina clarella sp. nov.

Figures 9-11

Serolis sp.—Holdich & Harrison, 1980: 380, 382, figs. 4E, 4F.

Material examined. Holotype. Vic. Western Port, Crib Point, (38°21'S., 145°14'E.), 10 m, sandy sediments, Smith-McIntyre grab, Marine Studies Group, Fisheries and Wildlife Department, 13 Oct 1964 (stn CPBS C5), NMV J6514 (♂, 9.3 mm).

Paratypes. Type locality, NMV J6515 (♀, 10.0 mm). Western Port, Crib Point, other CPBS stations: stn C4, NMV J6532 (1 ♀); stn C5, J6516 (2 juveniles); stn C6, J6533 (1

juvenile); stn 22N, J6534 (1 juvenile); stn 26N, AM P34791 (1 ♀, 2 juveniles); stn 32E, NMV J6536 (2 juveniles); stn 34N, J6535 (2 juveniles) LACM 3001 (1 juvenile), USNM 221527 (1 juvenile); stn 34S, NMV J6537 (1 ♀, 1 juvenile); stn 36N, J6538 (1 juvenile); stn 40E, J6539 (1 ♀), J6540 (1 ♀, 2 juveniles); stn 51N, J6541 (1 juvenile).

Other material. Vic., Western Port, Shoreham, NMV J6543(1), J6544(1). Western Port, WBES stn 1733, NMV J6542(1). Port Phillip Bay, PPBES stations: stn 968, NMV J6545(1); stn 975, J6546(1).

Bass Strait. BSS stations: stns 72 and 194, off Cape Otway, NMV J7137(1) J6758(2); stn 168, off N. end of Flinders Is., NMV J6559(2).

Tas. Furneaux Group, Fisher Is., TM G2025(1).

Description. Male. Body 1.1 times as long as wide. Coxae 1-4 closely applied, posterodistal corners acute; deep fissure between coxae 4 and 5 and between coxa 6 and pleonite 2. Pleonites 2 and 3 with acute posteriorly-directed corners reaching well beyond base of uropods.

Head with 5 flat rounded lobes along posterior margin, median one most distinct. Eye reniform, with prominent medioposterior eave. Pereonites 1-5 and pleonites 1-3 with broadly-based triangular projections on midline of posterior margin, most pronounced on pereonite 5 and pleonite 1. Pereon without lateral sculpture. Pleotelson broadly triangular, tapering from base, lateral margins concave distally; a sharp flat ridge on lateral anterior two-thirds, often divided into 2 parts, sometimes irregularly; with mid-dorsal crest of even height throughout.

Antenna 1 article 2 2.2 times as long as wide, anterodistal corner produced; article 3 0.8 times length of article 2, decidedly tapering over distal two-thirds; article 4 0.3 times length of article 3; flagellum of 14 articles, last 2 minute. Antenna 2 article 4 evenly tapering from broad base; article 5 1.5 times length of article 4, 4.5 times as long as wide, tapering both distally and proximally; flagellum of 11 articles.

Pereopod 2 articles 2 and 3 elongate; article 4 with more than 20 plumose setae; article 5 ovate, 0.6 length of article 4, with about 30 plumose setae; article 6 compactly falcate, its posterior margin convex distally, with 2 rows of 6 spines proximally; dactylus unguis attached near tip, about one-quarter of whole length. Pereopod 6 article 3 broadened proximally, with dense row of setae along anterior margin; articles 4-6 with groups of strong setae on posterior margin; article 4 with anterodistal group of long setae; arti-

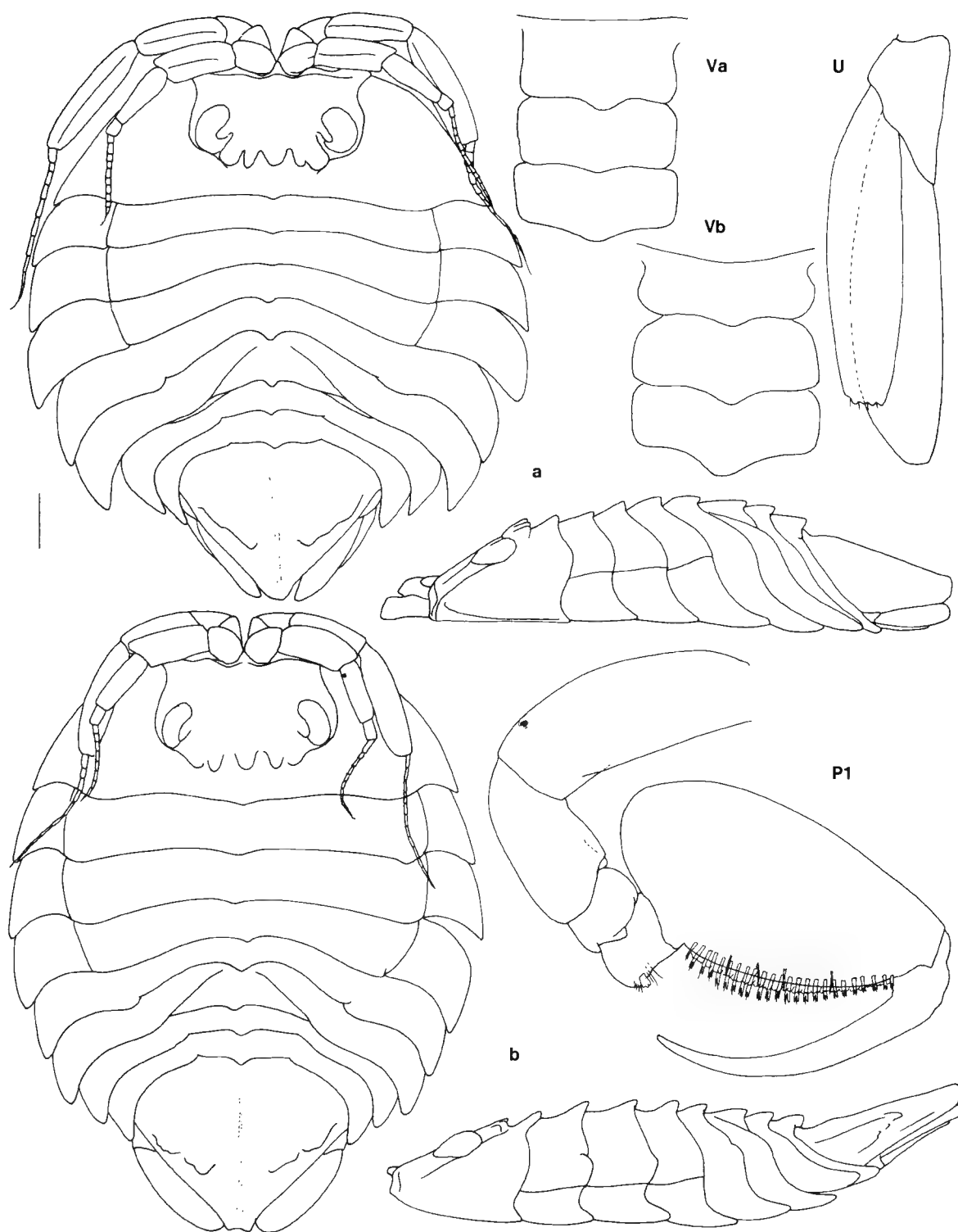


Figure 9. *Serolina clarella*. a, male holotype, 9.3 mm; b, female paratype, 10.0 mm, NMV J6515.

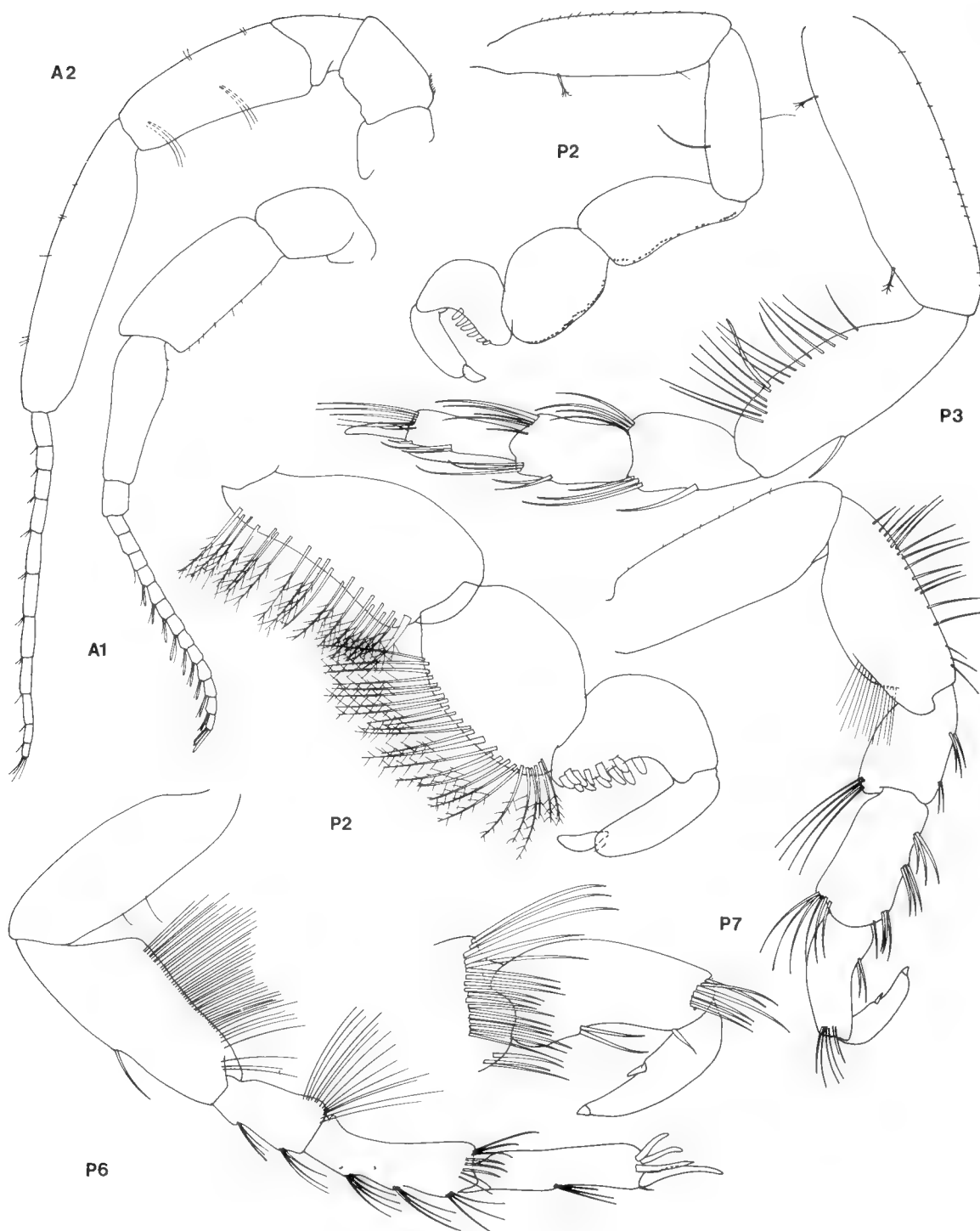


Figure 10. *Serolina clarella*, male holotype, 9.3 mm.

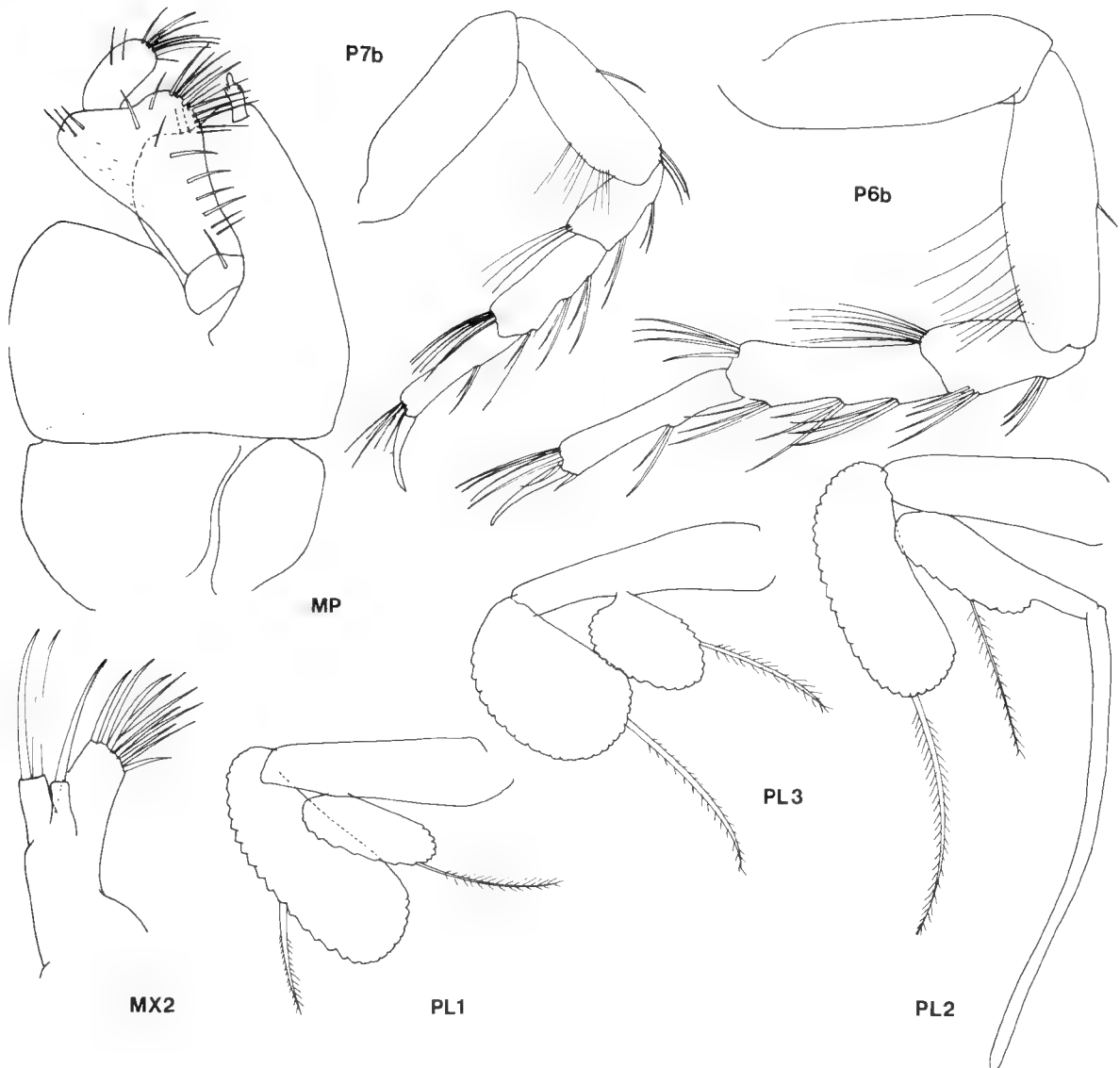


Figure 11. *Serolina clarella*. a, male holotype, 9.3 mm; b, female paratype, 10.0 mm, NMV J6515.

cle 5 with proximal projection anteriorly (on pereopod 5 also); article 6 slightly dilated distally with 3 strong apical spines; dactylus small. Pereopod 7 articles 3-5 broad; article 3 with clusters of setae posteriorly and anteriorly; articles 4-5 with groups of strong setae on posterior margin; article 6 tapering, posterior margin concave with 2 strong setae; dactylus broad, with short spine on mid-posterior margin.

Pleopod 2 appendix masculina 2.4 times length of endopod. Uropod endopod tapering only over distal quarter; exopod 0.8 length of endopod,

tapering to truncate-crenulate apex, with short apical setae.

Female. Body 1.2 times as long as greatest width. Coxae and dorsal sculpture much as in male except for presence of very slightly produced marginal lateral lobes on pereonites 2 and 3.

Pereopod 6 articles 2-6 of normal narrow proportions, with few anterior setae; dactylus fine. Pereopod 7 articles 2-5 more elongate than in male; article 6 narrower than in male, straight; dactylus fine.

Distribution. Victoria, Bass Strait, Tasmania; 10–90 m.

Remarks. *Serolina clarella* is distinguished from other species by being highly domed and having only slight mid-dorsal crests. Lateral sculpture is absent. The species is unique in possessing five posterior head lobes.

The pereopods are remarkably dimorphic. The male pereopod 2 has very broad articles 4 and 5 and a strongly curved article 6; pereopod 6 has a broad article 3 and spinose article 6; pereopod 7 is shortened and the dactylus reflexed.

At 9.3 mm the male is one of the largest known in the genus.

***Serolina delaria* sp. nov.**

Figures 12–14

Serolis minuta.—Chilton, 1917: 394, 397, 398.—Holdich & Harrison, 1980: 376, 381, figs. 4A, 4B, 5C. (not *Serolis minuta* Beddard, 1884)

Material examined. Holotype. Vic. Shoreham (38°26'S, 145°03'E), S. Fulton (O.A. Sayce collection purchased 1911—no further details), NMV J6529(♂, 7.2 mm).

Paratypes. Vic. West Channel, probably Western Port (approx. 38°25'S, 145°10'E), (O.A. Sayce collection purchased 1911—no further details), NMV J6530 (♀, 9.1 mm). Western Port, Crib Point, (38°21.15'S, 145°14.31'E), 16 m, sand, Smith-McIntyre grab, Marine Studies Group, Fisheries and Wildlife Department, 22 Mar 1965 (CPBS stn 40E), NMV J6531 (2 juveniles, 4.6, 6.6 mm). Western Port, Western Channel (38°25.39'S, 145°15.97'E), 5 m, sand, Marine Studies Group, 25 Nov 1974 (WBES stn 1750), NMV J6790(♀, 9.2 mm).

Bass Strait. Off North Point, Tasmania (40°40'S, 145°15'E), 32 m, medium shelly sand, epibenthic sled, G. Poore et al. on FRV "Sarda", 4 Nov 1980 (BSS stn 115), NMV J6757 (2 juveniles).

Other material. SA. St Francis Island (32°31'S, 133°18'E), 11–24 m, J.C. Verco, SAM C386 (♀, 8.3 mm). Port Hughes (34°05'S, 137°33'E), 2 m, sand and *Posidonia*, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA21), NMV J11928(10). Giles Point (35°03'S, 137°46'E), 1 m, sand inside *Posidonia* meadow, G.C.B. Poore and H.M. Lew Ton, 19 Mar 1985 (stn SA37), NMV J11929 (♂, 7.2 mm). Flinders Is., bay on NW coast (33°41.7'S, 134°8.5'E), 3 m, sand, G.C.B. Poore and H.M. Lew Ton, 19 Mar 1985 (stn SA60), NMV J11930(1). "The Hotspot" reef 8 km W. of Flinders Is. (33°40.8'S, 134°22.5'E), 21 m, coarse shelly sand, G.C.B. Poore, 20 Apr 1985 (stn SA73), NMV J11931(1). Venus Bay, off township (33°13.8'S, 134°40.1'E), 3 m, sand flat, G.C.B. Poore, 23 Apr 1985 (stn SA86), NMV J11932(7). Venus Bay, S of Germein Is. (33°13.2'S, 134°40.1'E), 2 m, shelly sand flat, G.C.B. Poore, 23 Apr 1985 (stns SA87 and SA88), NMV J11933(4), J11934(3).

Description. Male. Body only little longer than

wide. Coxae 1–4 closely overlapping; coxae 5 and 6 and pleonites 2 and 3 separated by narrow fissures, regularly spaced, apices narrowly acute.

Head with 3 flat, narrow lobes separated by deep grooves on posterior margin; each lobe rounded-truncate posteriorly; lateral lobes separated from eyes by deep grooves. Eye reniform, overhanging posterolateral margin of head.

Pereonites 1–5 and pleonites 1–3 each with narrow acute mid-dorsal crest, largest on pleonite 1 only slightly longer than rest. Pereonites 2–4, and less obviously on 1 and 5, with lateral subtriangular lobes, all posteriorly directed. Pereonites 1–4 with 6–8 midlateral marginal rounded crenulations; pereonites 5 and 6 with only 2–3 uneven lobes. Pleotelson triangular, truncate posteriorly; with mid-dorsal crest more pronounced anteriorly.

Antenna 1 article 2 3.0 times as long as wide, anterodistal corner square; article 3 0.7 times length of article 2, tapering over most of length; article 4 0.3 times length of article 3; flagellum of 10 articles, last 2 minute. Antenna 2 article 4 tapering; article 5 1.5 times length of article 4, 4.1 times as long as wide, elongate-ovate; flagellum of 10 articles.

Pereopod 2 articles 2 and 3 elongate; article 4 with 17 plumose setae; article 5 0.4 times length of article 4, posterior margin distally lobed, with 16 plumose setae; article 6 tapered, posterior margin with proximal lobe, bearing 9 spines in 2 rows, distally concave; dactylus unguis attached near tip, about one-third of whole length. Pereopod 6 articles 3–6 with anterodistal rows of 6–9 setae and clusters of setae along posterior margin; article 5 3.5 times as long as wide. Pereopod 7 articles 3–5 more or less quadrate-linear, with few anterodistal setae; article 6 ovate but tapering and with prominent proximal thumb, posterior margin with 3 setae; dactylus simple, curved.

Pleopod 2 appendix masculina 3.6 times length of endopod. Uropod endopod with rounded-truncate apex; exopod 0.7 length of endopod, truncate.

Female. Body 1.1 times as long as wide. Coxae and body sculpture pattern as in male but sculpture more pronounced. Lateral crests on pereonites 2–5 subacute posteriorly and on pereonite 2 abruptly acute anteriorly also. Midlateral ridges on pereonites 1–6 crenulate and over-

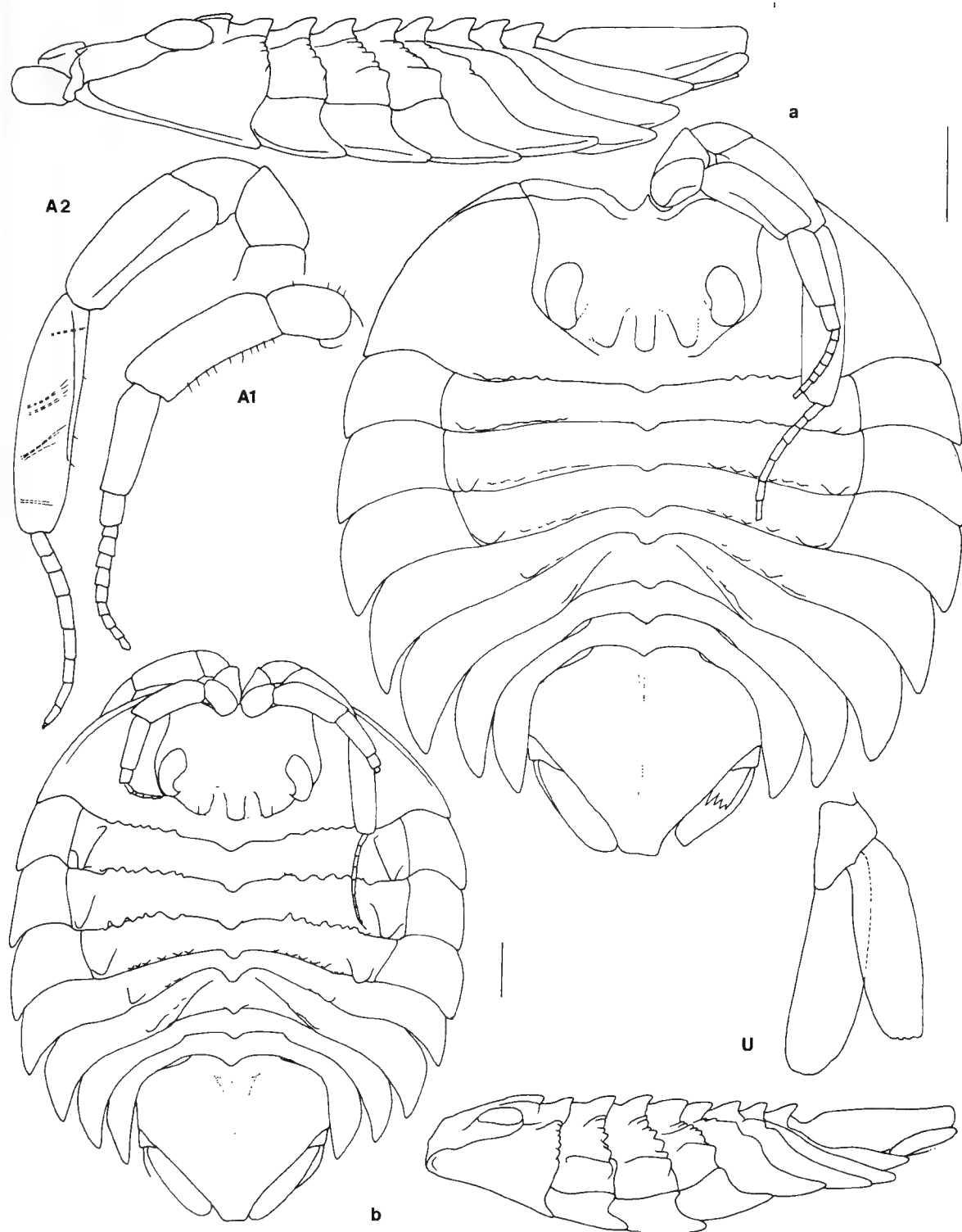


Figure 12. *Serolina delaria*. a, male holotype, 7.2 mm; b, female paratype, 9.1 mm, NMV J6530.

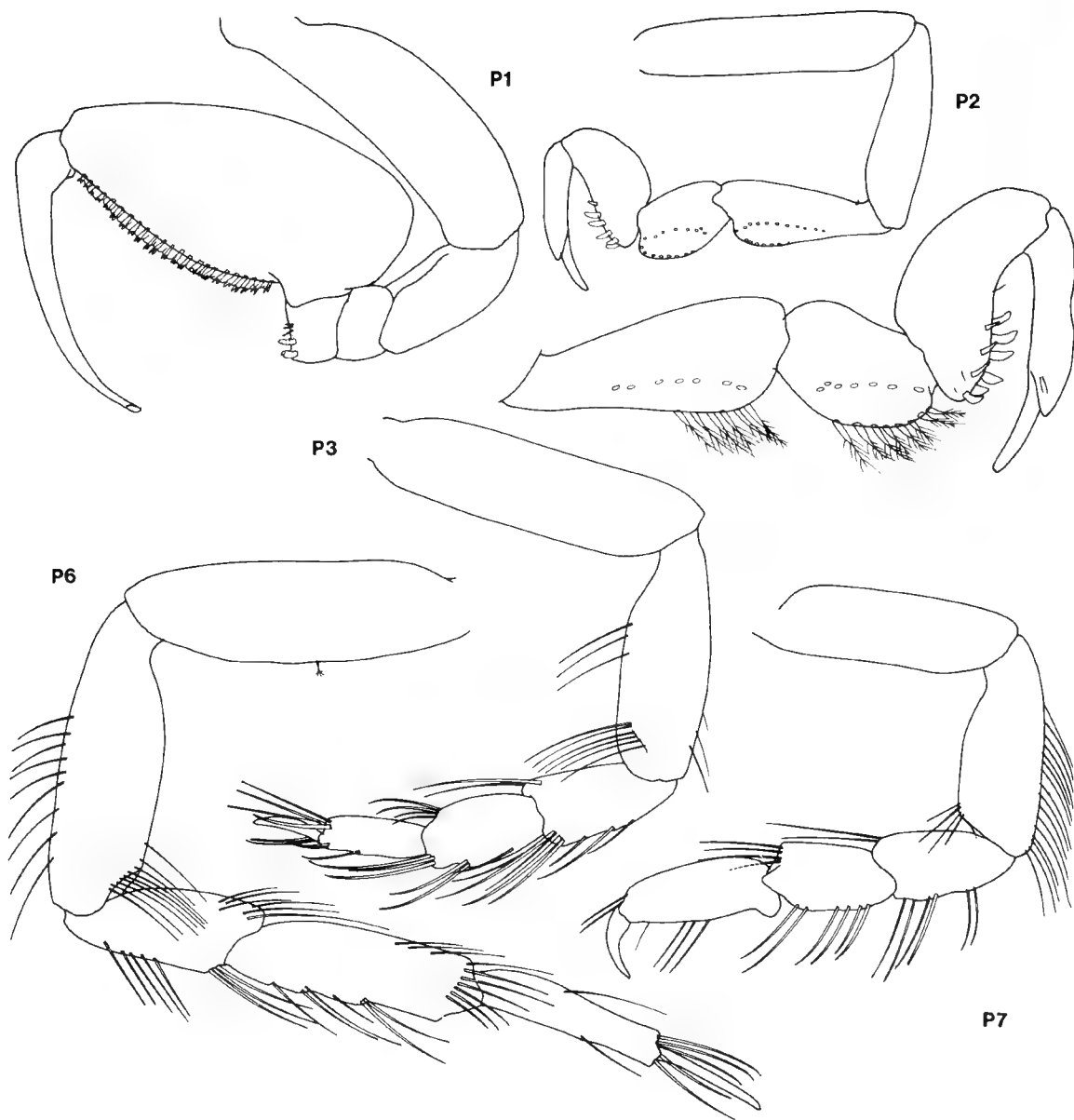


Figure 13. *Serolina delaria*, male holotype, 7.2 mm.

lap posterior margins of pereonites. Pleotelson as in male. Pereopods 6 and 7 more elongate than in male and with simple setation.

Distribution. Victoria, Bass Strait, South Australia; 1-32 m.

Remarks. *Serolina delaria* is distinguished from other species by its large size and by the strong

ridge of midlateral crenulations on each pereonite. the three posterior head lobes are prominent and the mid-dorsal crests are strong and even. The female reaches 9.2 mm and the male 7.2 mm.

***Serolina eugeniae* (Nordenstam) comb. nov.**

Figures 15-17

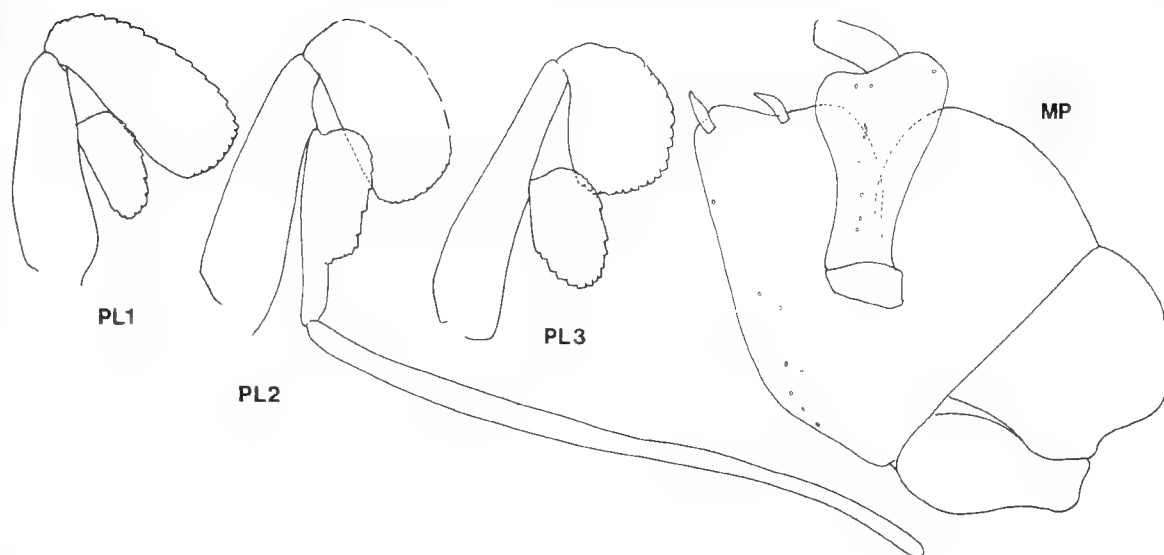


Figure 14. *Serolina delaria*, male holotype, 7.2 mm.

Serolis (Homoserolis) minuta var. *eugeniae* Nordenstam, 1933: 39, 40, 43-45, 47-49, 82-84, pl 1 fig 3, text-figs. 11b, 20.-Holdich & Harrison, 1980: 377, 381, figs. 3E, F.

Material examined. Holotype. NSW, Port Jackson, "The Lighthouse", 22 m, "Eugenie" Expedition, 1851-1853, SMNH 808 (ovigerous ♀, 7.3 mm, with 5 slides).

Other material. NSW. E of North Head, Port Jackson (33°49'S, 151°18'E), 43 m, AM P24294 (♀, 6.7 mm). Off Moona Moona Creek, Jervis Bay, 8-15 m, AM P35615-P35618, P35623-P35624 (2 ♂♂, 4 ♀♀).

Bass Strait, eastern, north-western and western slope regions, 51-144 m: 10 ♂♂ (4.3-5.8 mm), 15 ♀♀ (4.7-6.5 mm), 35 juveniles (2.5-3.9 mm) from BSS stations 98, 103, 155, 162, 163, 181, 195 and 209, NMV J6763, J6764, J6780-J6787, J7138, J7139.

Description. Male. Body 1.1 times as long as wide. Coxae 1-6 closely overlapping only coxa 6 with a posteriorly produced subacute corner; coxa 6 and pleonite epimera 2 and 3 separated by deep narrow fissures.

Head with broadly-based mid-dorsal cone dominating dorsal sculpture; obscure lateral lobes separated from eyes by shallow grooves. Pereonites 1-3 without mid-dorsal sculpture; pereonites 4 and 5 with low mid-dorsal crest; pleonites 1-3 with triangular mid-dorsal lobe, most prominent on pleonite 1. Pereonites 1-6 with flat lateral tubercles, obscure on pereonite 1, more conical on 2-4, and flatter on 5 and 6. Pleotelson triangular, apex rounded; obscure medial ridge most obvious posteriorly, simple flat lateral tubercle one-third way along.

Antenna 1 article 2 2.4 times as long as wide, anterodistal corner rounded; article 3 0.7 times length of article 2, tapering gradually; article 4 0.4 times length of article 3; flagellum of 11 articles, last 2 minute. Antenna 2 article 4 tapering abruptly distally; article 5 1.3 times length of article 4, 3.3 times as long as wide, elongate-ovate; flagellum of 10 articles.

Pereopod 2 articles 2 and 3 elongate; article 4 with 19 plumose setae in 2 rows; article 5 0.6 length of article 4, posterior margin convex, with 15 plumose setae; article 6 tapering distally, posterior margin concave distally, with 2 rows of 4 or 5 spines in proximal half; dactylus unguis attached near tip, about quarter of whole length. Pereopod 6 article 3 anterior margin convex, with row of distal setae; article 4 with swollen distal lobe on anterior margin bearing about 20 tubular setae; article 5 3.5 times as long as wide. Pereopod 7 articles 3-5 ovate-elongate, with anterodistal clusters of 4-5 setae; article 6 linear, 2 setae on posterior margin, 4 setae anterodistally; dactylus with prominent proximal lobe on posterior margin, lobe and dactylus apex curved mesially.

Pleopod 2 appendix masculina 2.4 times length of endopod. Uropod endopod with evenly convex lateral margin, tapering to acute apex; exopod 0.6 times length of endopod, oblique-truncate, with apical setae.

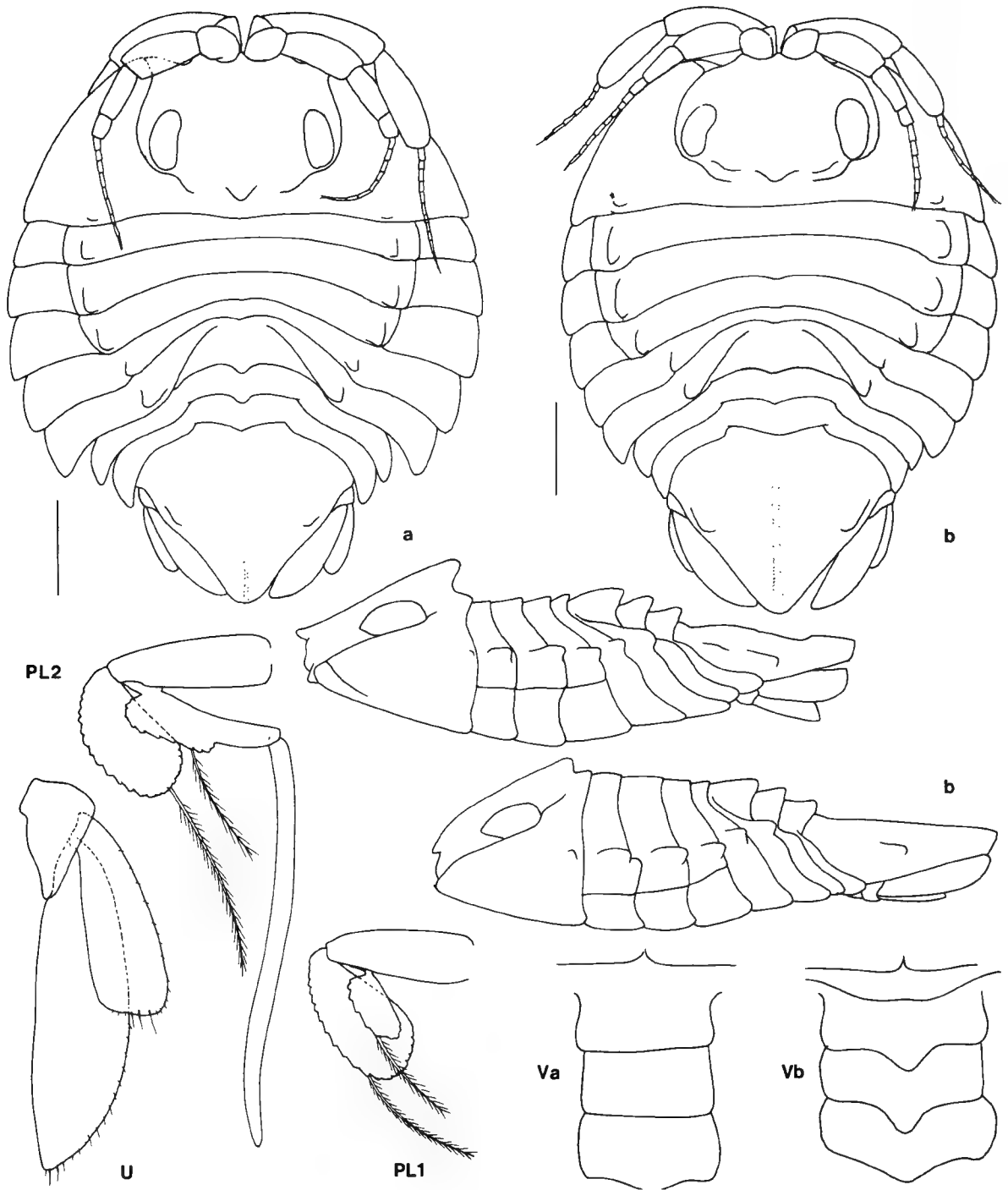


Figure 15. *Serolina eugeniae*. a, male holotype, 5.6 mm; b, female paratype, 5.4 mm, J6764.

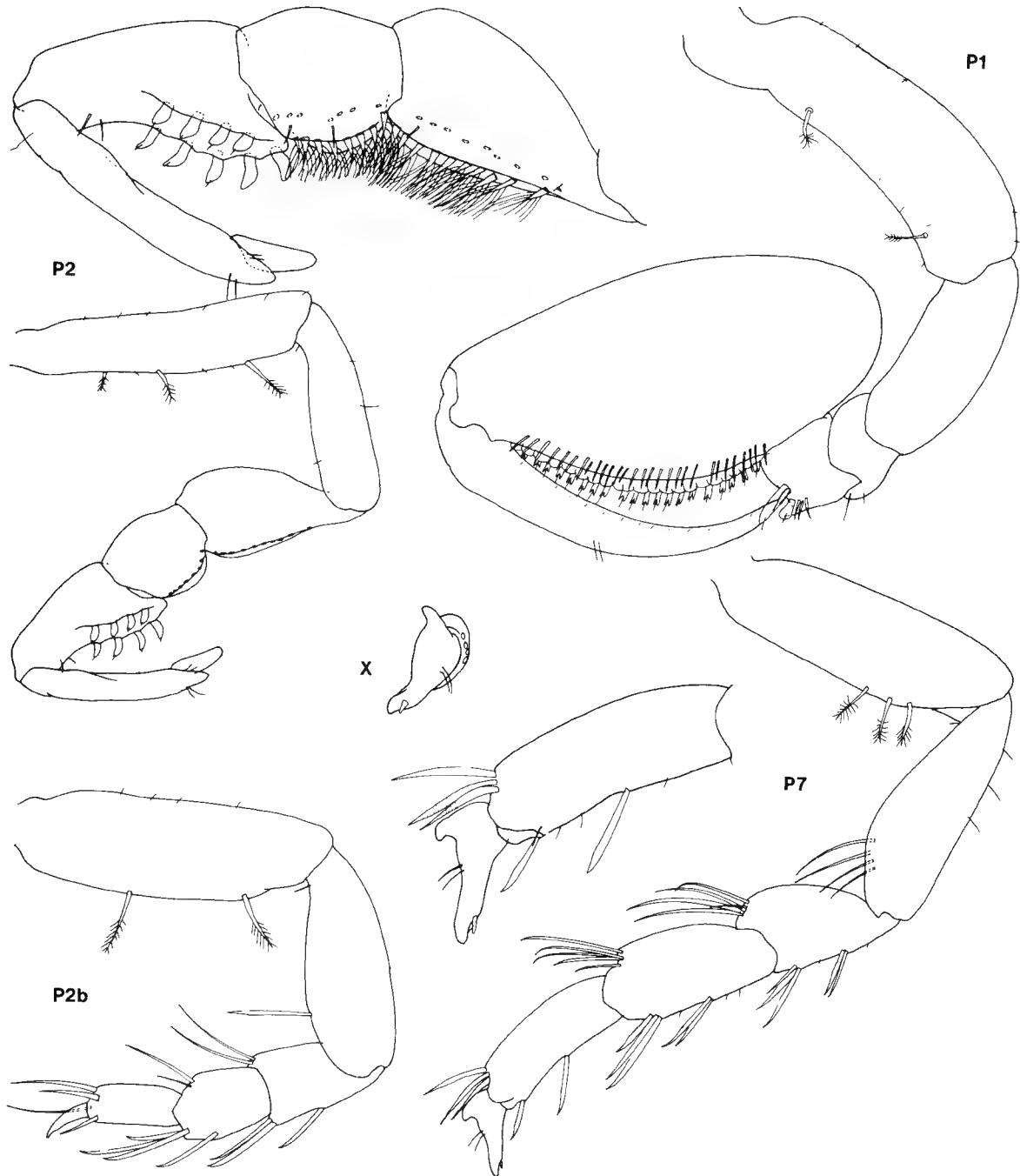


Figure 16. *Serolina eugeniae*. a, male holotype, 5.6 mm; b, female paratype, 5.4 mm, J6764; X, distal view of right pereopod 7 dactylus holotype.

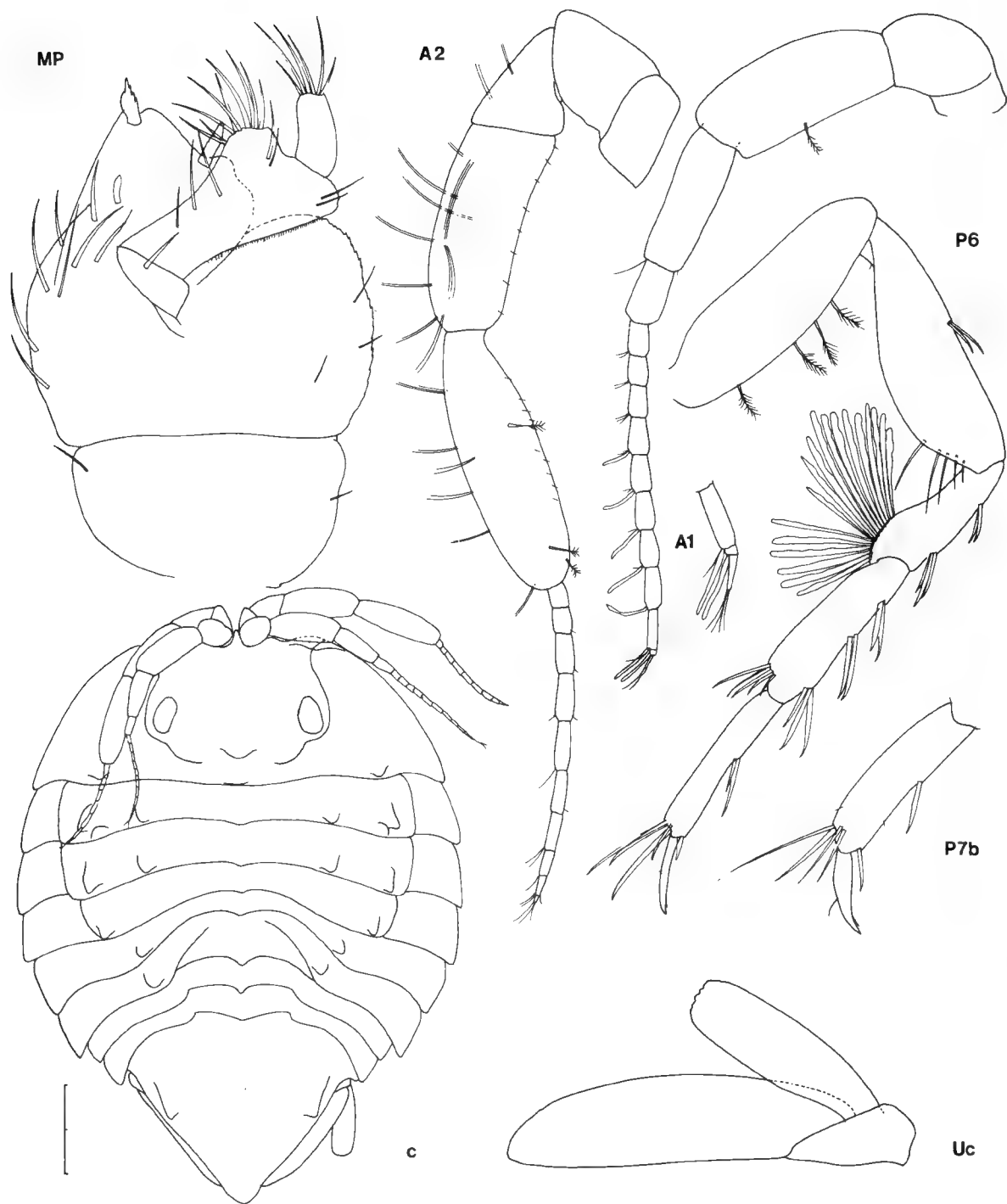


Figure 17. *Serolina eugeniae*. a, male holotype, 5.6 mm; b, female paratype, 5.4 mm, J6764; c, ovigerous female, 6.4 mm, J6784.

Female. Body 1.3 times as long as wide. Coxae and pleonal epimera closely overlapping except for shallow notch between coxa 6 and epimeron 2. Head and dorsal sculpture as in male except that mid-dorsal crests are less prominent. Pereonite 2 sometimes with a bilobed or simple marginal lateral lobe overlapping pereonite 3.

Pereopod 2 with broad articles (article 4 1.8 times as long as wide). Pereopod 6 of similar proportions to that of male but article 4 with fewer and simple setae, article 3 shorter. Pereopod 7 basal articles similar to those of male; article 6 narrower, straight; dactylus simple, falcate.

Distribution. Central New South Wales coast to Bass Strait; 8-144 m.

Remarks. *Serolina eugeniae* was originally described as a subspecies of *Serolis minuta*. It is here elevated to specific rank on the basis of its characteristic sculpture and male pereopods. The two species are found together in Jervis Bay but although both occur in Bass Strait they were never found together in the same sample.

The species is most easily recognised by its strong mid-dorsal head cone, long mid-dorsal crests posteriorly, lateral crests and pleotelson ridges. The dactylus of the male pereopod 7 has a characteristic anterior tubercle. In the male pereopod 7 tubular setae are seen, similar to those found in *S. granularia* and *S. orriella*.

One female of similar size to other adults (Fig. 17c) is differentiated from all others by midlateral tubercles on pereonites 2 and 3, uropodal exopod much narrower, and narrower antennae and pereopods. It co-occurred in Bass Strait with more typical specimens but no male with similar differences was found.

Serolina granularia sp. nov.

Figures 18, 19

Material examined. Holotype. Tas. Bass Strait, E of Flinders Is. (40°06.8'S, 148°24.3'E), 22 m, coarse shell, Smith-McIntyre grab, G. Poore et al. on RV "Tangaroa", 14 Nov 1981 (BSS stn 166), NMV J6791 (♂, 7.2 mm).

Paratypes. Vic. Western Port, C. Gabriel (O.A. Sayce collection purchased 25 Jul 1911), NMV J6555 (♀, 10.0 mm).

Bass Strait. Central region (39°45.9'S, 145°33.5'E), 74 m, shell-bryozoan-mud, epibenthic sled, G. Poore et al. on RV "Tangaroa", 13 Nov 1981 (BSS stn 156), NMV J6756 (post-manca, 4.3 mm). S of Cape Schanck (38°33.6'S, 144°54.9'E),

55 m, coarse shell, epibenthic sled, G. Poore et al. on RV "Tangaroa", 12 Nov 1981 (BSS stn 154), NMV J7145 (4 juveniles, 3.9-5.3 mm). W. of Cape Otway (38°55'S, 143°25'E), 67 m, naturalists' dredge, G. Poore on HMAS "Kimbla", 8 Oct 1980 (BSS stn 53), NMV J7142 (submale, 6.3 mm). Off Warnambool (38°32'S, 142°28.6'E), 52 m, sandy coarse shell, epibenthic sled, R. Wilson et al. on RV "Tangaroa", 20 Nov 1981 (BSS stn 187), NMV J6755 (♂, 6.9 mm; post-manca, 4.5 mm).

Description. Male. Body 1.1 times as long as wide. Coxae 1-6 closely overlapping, only coxa 6 with posteriorly produced rounded corner; coxa 6 and pleonal epimera 2 and 3 separated by deep narrow fissures.

Head with low broadly-based lobe on posterior margin; obscure lateral lobes separated from eyes by very broad shallow groove. Eye without eave. Pereonites 1-5 without medial crest; pleonites 1-3 with very low long rounded crest. Pereonites 1-4 with obscure flat lateral lobes, not reaching posterior margin. Pleotelson tapering sharply from base, margins straight, apex truncate, anterior half with poorly-defined marginal-lateral ridges.

Antenna 1 article 2 2.3 times as long as wide, anterodistal corner obliquely angled; article 3 0.7 times length of article 2, tapering, anterior margin concave; article 4 0.3 times length of article 3; flagellum of 12 articles, last 2 minute. Antenna 2 article 4 with rounded distal corners; article 5 1.3 times length of article 4, 2.8 times as wide as long, narrow proximally but otherwise elongate-ovate; flagellum of 11 articles.

Pereopod 2 articles 2 and 3 elongate; article 4 with 14 plumose setae in 2 rows; article 5 0.7 times length of article 4, broad, posterior margin convex, with 9 plumose setae; article 6 tapering distally, posterior margin concave distally, with 2 rows each of 5 spines on proximal two-thirds; dactylus unguis attached near apex, about one-quarter of whole length. Pereopod 6 article 3 with convex anterior margin with row of distal setae; article 4 narrow proximally, distally with posterior ridge bearing about 20 tubular setae; article 5 3.0 times as long as wide. Pereopod 7 articles 3-5 with anterodistal clusters of 6-7 setae, article 6 quadrate-linear, 2+[1 setae on posterior margin, 4 setae anterodistally; dactylus short, with small lateral lobe near base and accessory spine laterally near apex.

Uropodal endopod with evenly convex lateral margin, tapering to acute apex; exopod 0.6 times

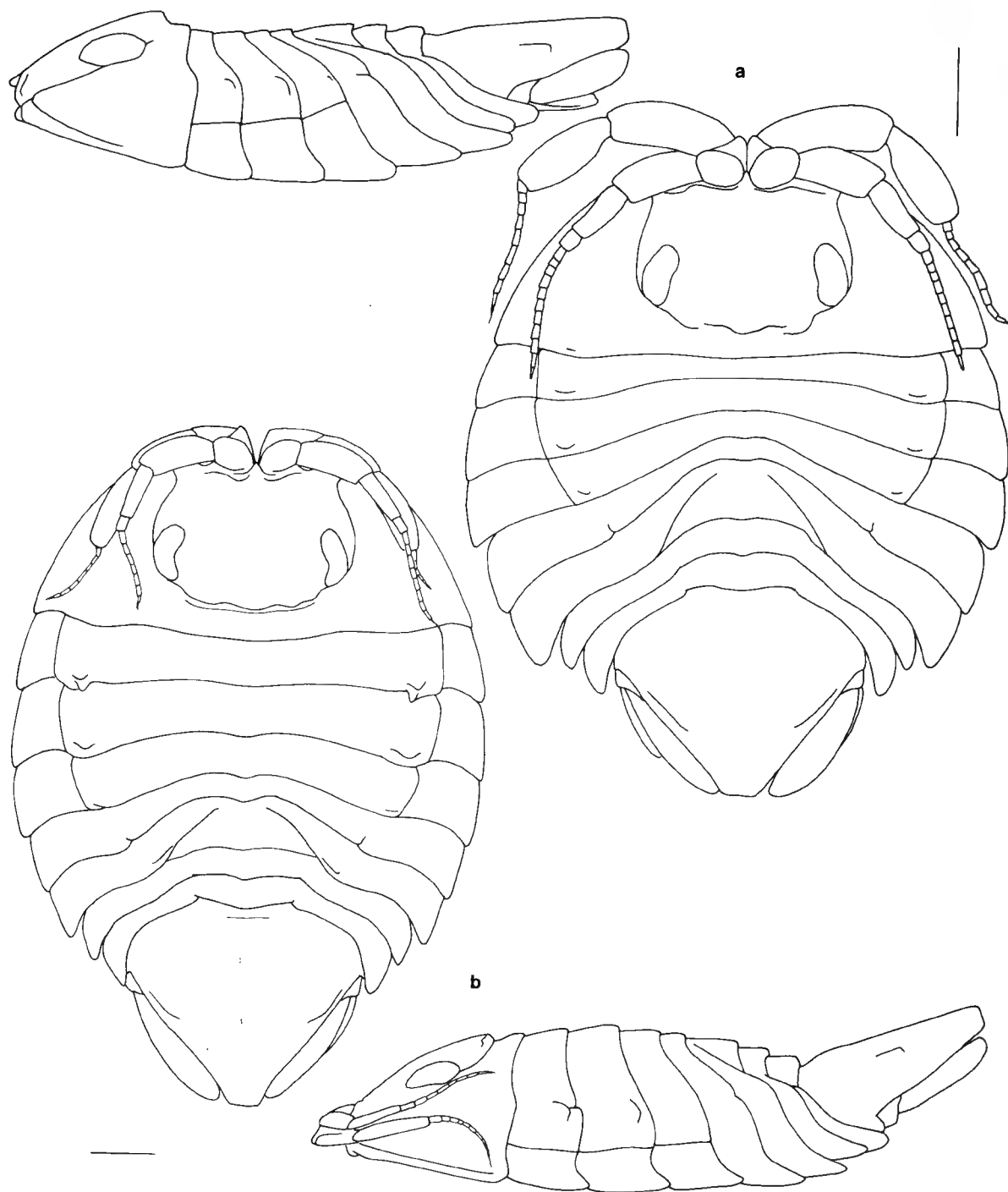


Figure 18. *Serolina granularia*, male holotype, 7.2 mm; b, female paratype, 10.0 mm, NMV J6555.

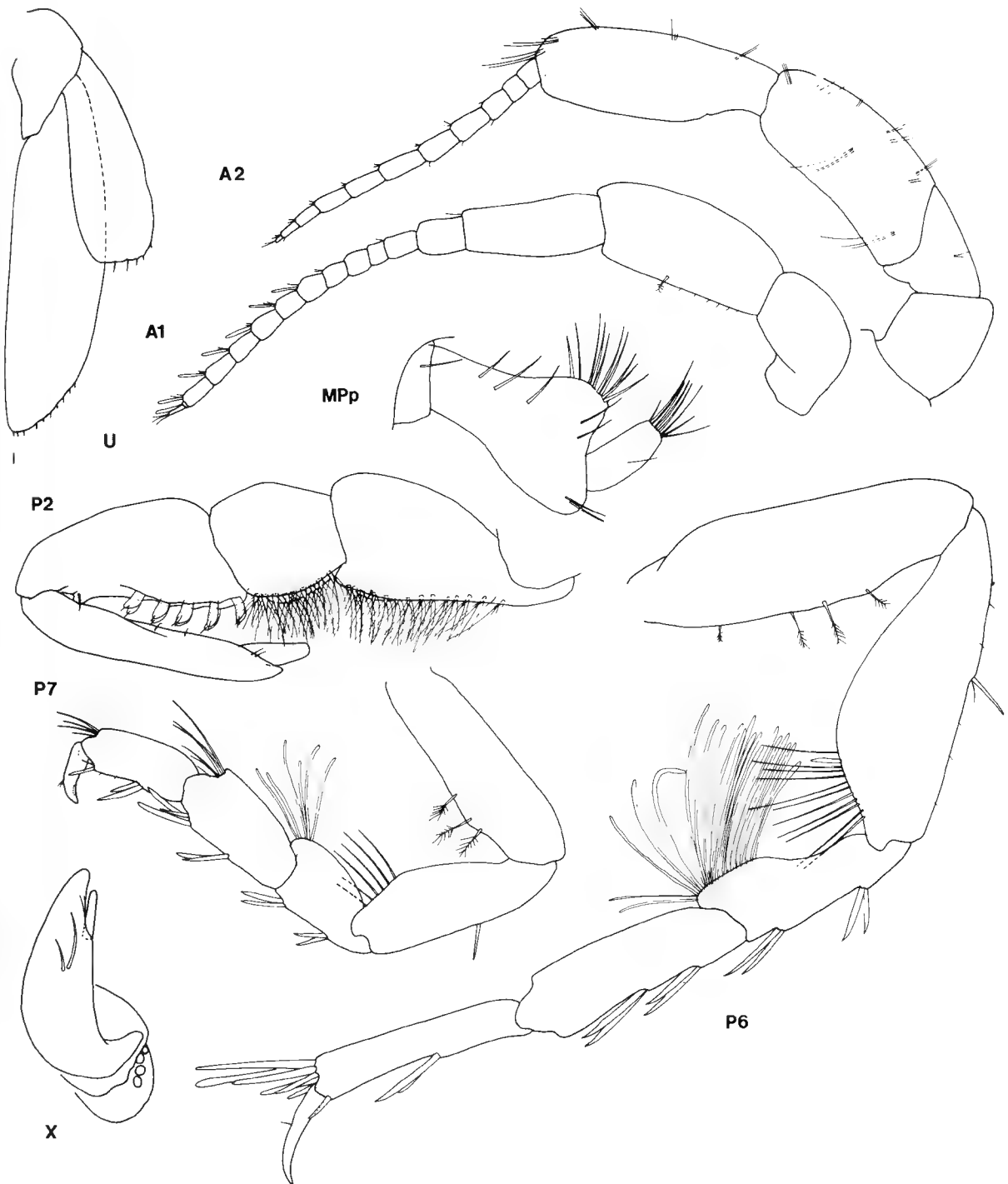


Figure 19. *Serolina granularia*, male holotype, 7.2 mm; X, distal view of right pereopod 7 dactylus holotype.

length of endopod, rounded truncate, with short apical setae.

Female. Body 1.3 times as long as wide. Coxae 1-6 closely overlapping; coxa 6 and pleonal epimera separated by narrow shallow fissures. Head sculpture as in male but less developed. Pereonites 1-2 with lateral lobes, pereonite 2 with acute marginal lateral spine. Pereopod 6 narrower than in male, article 3 not lobed, without tubular setae, pereopod 7 more elongate, dactylus simple.

Distribution. Bass Strait; 22-74 m.

Remarks. *Serolina granularia* is a smooth species with only a slight mid-dorsal head tubercle and posterior ridges. There are slight lateral bosses on some pereonites and on the pleotelson. The male is notable for the tubular setae on pereopod 6 and the short dactylus on pereopod 7. It differs from *S. orriella* in the much shorter uropodal exopod and the simpler male pereopod 7.

Serolina holia sp. nov.

Figures 20-22

Serolis minuta Group 1.—Holdich & Harrison, 1980: 374-377, 381, figs. 1A, 1B, 2, Table 1. (not *Serolis minuta* Beddard, 1884)

Material examined. Holotype. Qld. Townsville, Cleveland Bay (19°13'S, 146°55'E), 9 m, soft mud on shell/mud, P. Arnold et al., 10 Jun 1975, QM W6307 (♂, 3.0 mm).

Paratypes. Type locality, QM W11947 (♀, 4.3 mm). Qld. Townsville, Halifax Bay, (18°58'S, 146°29'E), 11 m, P. Arnold et al., 23 Feb 1977, BMNH 1978:285:2 (♂, 3.0 mm; ♀, 4.0 mm). Townsville, Halifax Bay, 11 m, P. Arnold et al., 24 Aug 1976, NMV J7146 (♂, 3.5 mm). Townsville, Halifax Bay, muddy sand, 2 m, P. Arnold et al., 24 Feb 1976, NMV J9600 (♂, 3.1 mm). Townsville, Halifax Bay, muddy sand, 10 m, P. Arnold et al., no date, NMV J9801 (♀, 3.8 mm).

Description. Male. Body 1.2 times as long as wide. Coxae 1-6 margins contiguous, posterodistal angles square or more rounded-acute posteriorly; coxa 6 separated from pleonite epimera 2-3 by shallow broad angle.

Head with 3 low obscure lobes on posterior margin, lateral pair more prominent than medial one; eye reniform, defined by shallow broad groove, without eave; 2 low bosses between anterior margins of eyes. Pereonites 1-5 and pleonites 1-3 without mid-dorsal crests (some males with obscure median tubercle on pereonites

2-4). Pereon and pleon without lateral sculpture. Pleotelson with slight broad mid-dorsal crest; lateral margins convex and extending as ridge over uropod.

Antenna 1 article 2 2.5 times as long as wide, distal margin oblique; article 3 half length of article 2; article 4 0.7 times length of article 3; flagellum of 12 articles, last 2 minute. Antenna 2 article 4 tapering; article 5 1.2 times length of article 4, 2.6 times as long as wide, with convex anterior margin; flagellum of 9 articles.

Pereopod 2 article 3 shorter and narrower than article 2; article 4 with 6 plumose setae in 2 rows; article 5 0.7 times length of article 4, posterior margin strongly convex, with 9 plumose setae in 2 rows; article 6 tapering, posterior margin concave beyond strong proximal heel, with 7 spines concentrated on heel; dactylus unguis attached apically, about one-third of whole length. Pereopod 6 articles 3-5 linear, with anterodistal groups of 3-4 setae, those on article 4 tubular, and groups of setae along posterior margin; article 5 3.0 times as long as wide. Pereopod 7 articles 3-5 quadrate-linear with anterodistal and posterior groups of setae; article 6 slightly tapering, with midposterior and distoposterior setae; dactylus hooked, simple, slightly flattened.

Pleopod 2 appendix masculina 3.2 times length of endopod. Uropod endopod elongate, lateral margin curved, apex acute; exopod 0.7 times length of endopod, widest distally and apically rounded.

Female. Body 1.3 times as long as greatest width. Coxae and pleonal epimera as in male. Head sculpture more pronounced than in male. Pereonites 1-5 and pleonites 1-3 with low mid-dorsal crests; pereonites 1-4 sometimes with obscure lateral bosses, posterior margins laterally convex. Pereopods 5 and 6 slightly shorter than in male. Pereopod 7 more elongate than in male, dactylus fine, straight and simple.

Distribution. Townsville, North Queensland; 9-11 m.

Remarks. This relatively smooth tropical species is easily recognised by the almost-equal lengths of articles 3 and 4 of antenna 1. The male pereopod 6 bears tubular setae on only article 4 (in other species where they occur they are on article 3).

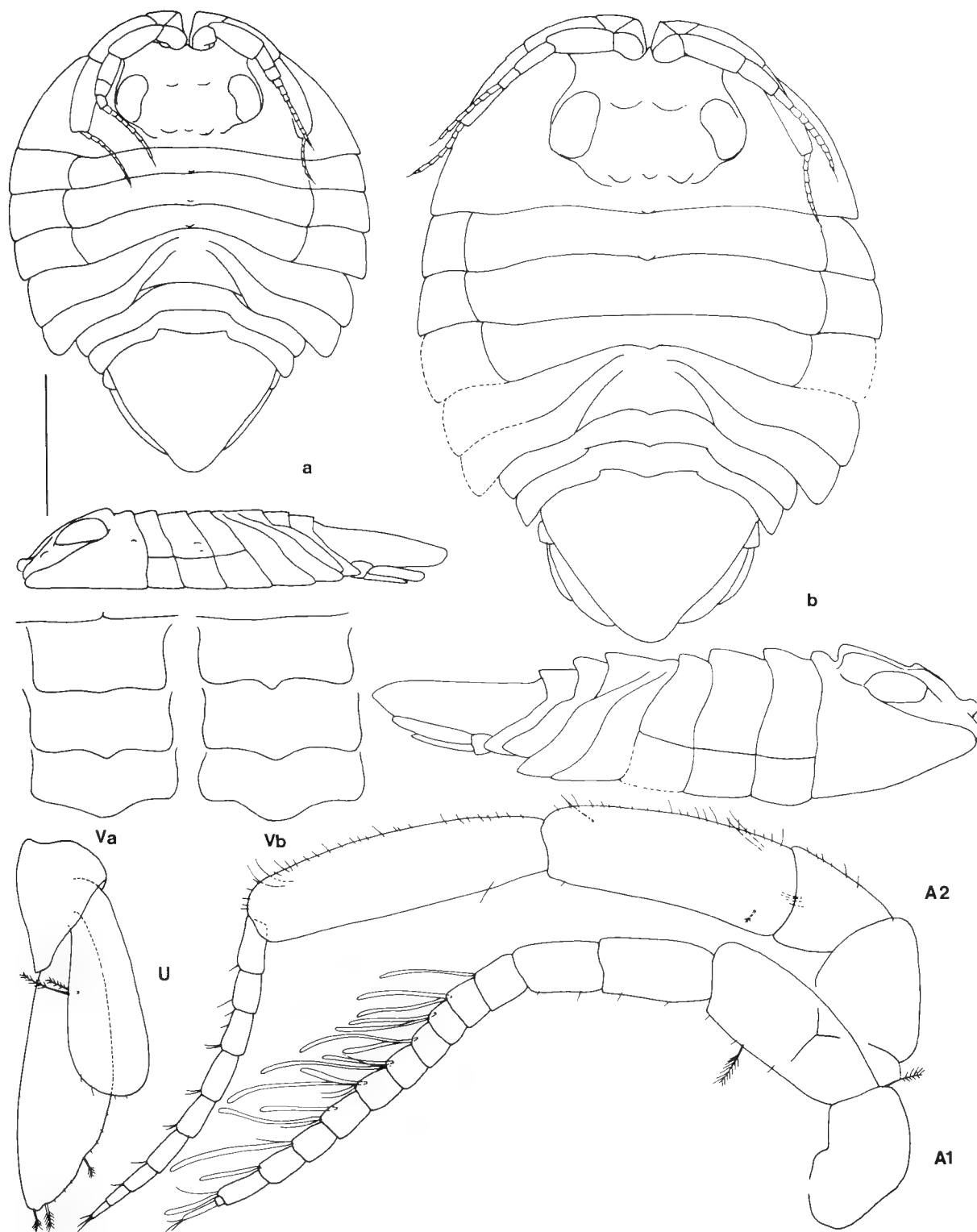


Figure 20. *Serolina holia*. a, male holotype, 3.0 mm; b, female paratype, 4.3 mm, QM W11947.

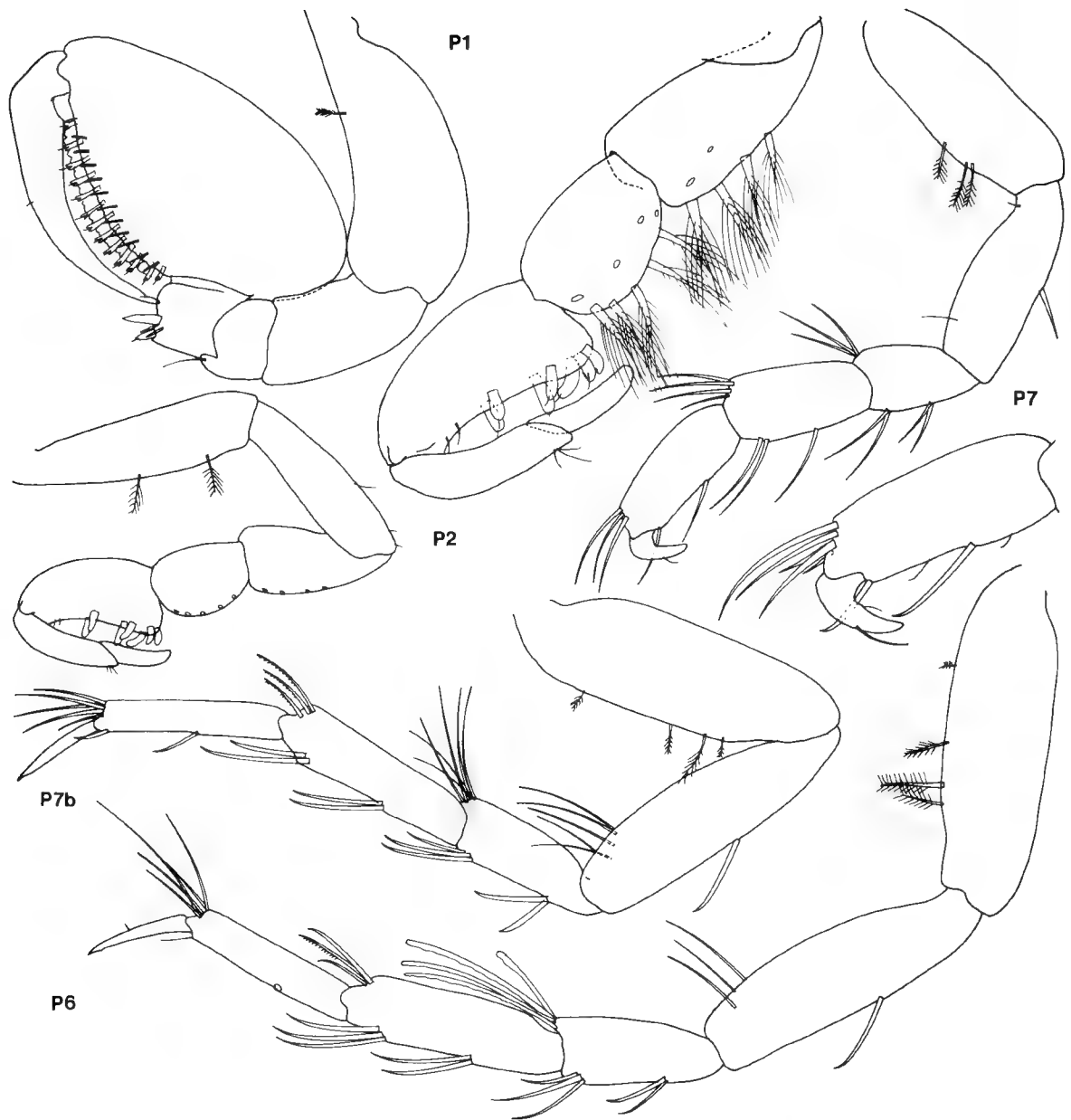


Figure 21. *Serolina holia*. a, male holotype, 3.0 mm; b, female paratype, 4.3 mm, QM W11947.

Holdich and Harrison (1980) differentiated *S. holia* (as *Serolis minuta* Group-I from *S. kawina* (as Group-II) ecologically. They noted that *S. holia* was found consistently in deeper water than *S. kawina*.

***Serolina kawina* sp. nov.**

Figures 23-25

Serolis minuta Group II.—Holdich & Harrison, 1980: 374-377, figs. 1C-E, 2, Table 1. (not *Serolis minuta* Beddard, 1884)

Material examined. Holotype. Qld. Calliope R., near mouth (23°55'S, 151°10'E), 3-5 m, sand, J. Moverley, 1973-83, QM W11945 (♂, 4.0 mm, with 2 slides).

Paratypes. Type locality, QM W11946 (♀, 4.3 mm), QM W10674 (6 ♂♂, 3.0-4.2 mm; 10 ♀♀, 3.1-5.4 mm; 10 juveniles, 1.5-3.0 mm), NMV J7413 (2 ♂♂, 2 ♀♀, 2 juveniles), AM P34796 (2 ♂♂, 2 ♀♀, 2 juveniles).

Other material. Qld. Halifax Bay, Townsville, P. Arnold, 23 Nov 1976, NMV J7147 (♀, 4.2 mm); 24 Aug 1976, NMV J7148 (1 ♂, 3.9 mm; 2 juveniles, 2.5, 3.5 mm); 4.2 m, sandy mud, P. Arnold, 24 May 1976, BMNH 1978:286:2 (♂, 3.6 mm; ♀, 4.1 mm), NMV J2946 (2 ♂♂, 3 ♀♀). Bowling Green Bay, Townsville, 3 m, sandy mud, P. Arnold, 7 Aug 1975, QM W6308 (♂, 3.7 mm; ♀, 4.4 mm).

Description. Male. Body 1.1 times as long as wide. Coxae 1-6 closely overlapping, only most posterior with acute corners; epimera 2 and 3 short, rounded, close and well overlapped by coxa 6.

Head with low mid-dorsal crest on posterior margin. Eye broadly reniform, only slightly elevated. Pereonites 1-6 without dorsal sculpture. Pleonites 1-3 with obscure mid-dorsal crest. Pleotelson with convex lateral margin bearing acute longitudinal ridge overlapping uropod.

Antenna 1 article 2 3.7 times as long as wide, distal margin oblique; article 3 0.6 times length of article 2, widest at midpoint; article 4 0.7 times length of article 3; flagellum of 11 articles, last 2 minute. Antenna 2 article 4 tapering; article 5 1.3 times length of article 4, 5.3 times as long as wide, only very slightly tapering; flagellum of 9 articles.

Pereopod 2 articles 2 and 3 elongate; article 4 with 16 plumose setae; article 5 0.6 times length of article 4, posterior margin convex, with 10 plumose setae; article 6 strongly tapering, posterior margin irregularly concave, with 8 spines in 2 rows; dactylus unguis attached near midpoint, about two-thirds of whole length. Pereopod 5 article 2 swollen proximally; article 3 with anterior margin bearing 7 widely-spaced transverse ridges; articles 4-7 similar to those of pereopod 6. Pereopod 6 articles 4-6 with anterodistal rows of 4-7 setae and small groups of setae along posterior margin; article 5 3.6 times as long as wide. Pereopod 7 articles 4 and 5 rectangular, with anterodistal rows of 3 setae; article 6 ovate, with 2 setae on posterior margin, 3 anterodistally; dactylus bifid, comprising curved anterior claw and tooth-bearing posterior thumb.

Uropod endopod broadest at midpoint and tapering to rounded apex; exopod 0.7 length of endopod, linguiform, rounded apex with short setae.



Figure 22. *Serolina holia*, male holotype, 3.0 mm.

Female. Body 1.2 times as long as wide. Coxae, epimera, dorsal sculpture as in male except that pereonite 2 bears broad lateral marginal lobe. Pereopod 5 articles 2 and 3 simple, elongate, without transverse ridges, articles 4-7 as in male. Pereopod 6 as in male. Pereopod 7 article 3 more elongate than in male, articles 4-6 narrower, dactylus simple.

Distribution. Northern to central Queensland; 3-5 m.

Remarks. *Serolina kawina* is distinguished from *S. holia* with which it co-occurs in north Queensland by its broader form the absence of head lobes, and different male pereopods. The male pereopod 5 is notable for the presence of transverse ridges on article 3, unique in the genus. The species is found at much shallower depths than *S. holia*.

Another species from the tropical continental slope, similar *S. kawina*, is discussed here as *Serolina* sp. following all other descriptions.

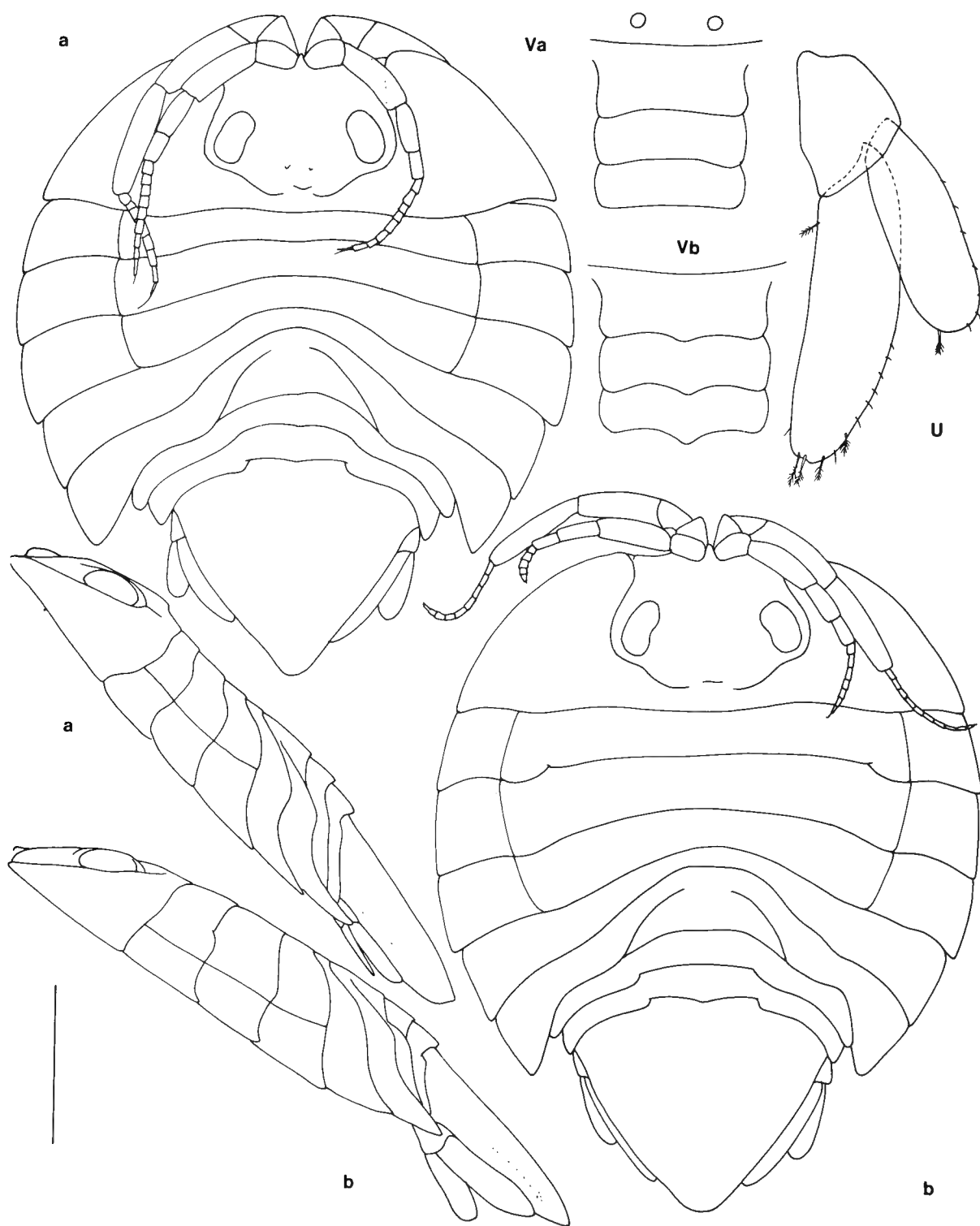


Figure 23. *Serolina kawina*. a, male holotype, 4.0 mm; b, female paratype, 4.3 mm, QM W11946.

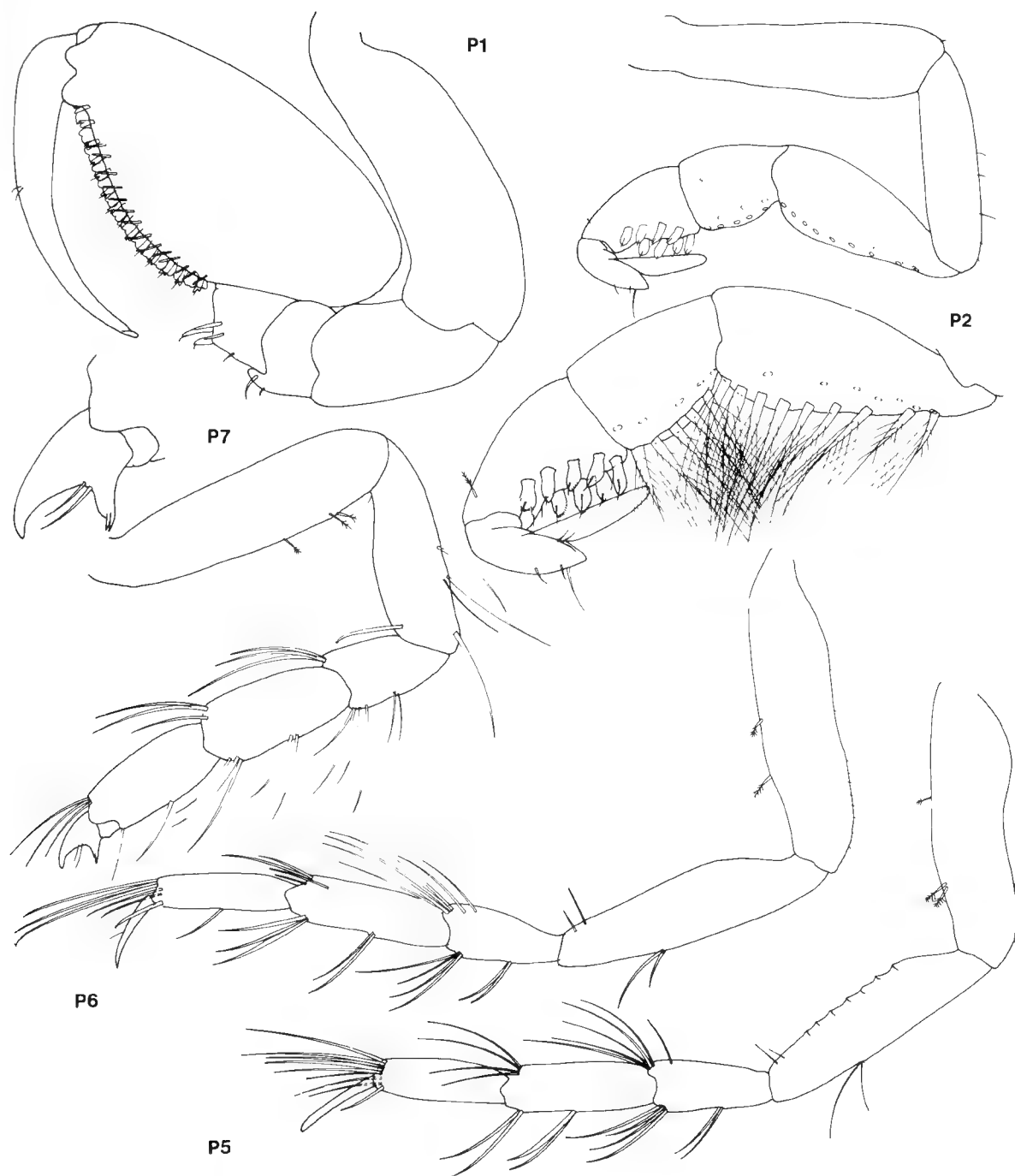


Figure 24. *Serolina kawina*, male holotype, 4.0 mm.

***Serolina minuta* (Beddard)**

Figures 26-28

Serolis minuta Beddard, 1884a: 337.-Beddard, 1884b: 66,

67, 77-79, pl. 7 figs 2-7.-Stebbing, 1893: 358.-Chilton, 1917: 394.-Hale, 1929: 307, 310, fig. 311.-Sheppard, 1933: 332, 333.-Nordenstam, 1933: 39, 40, 48, 49.-Holdich & Harrison, 1980: 374-386, figs. 3A, 3B.-Harrison & Poore, 1984: 13, 15, Table 1.

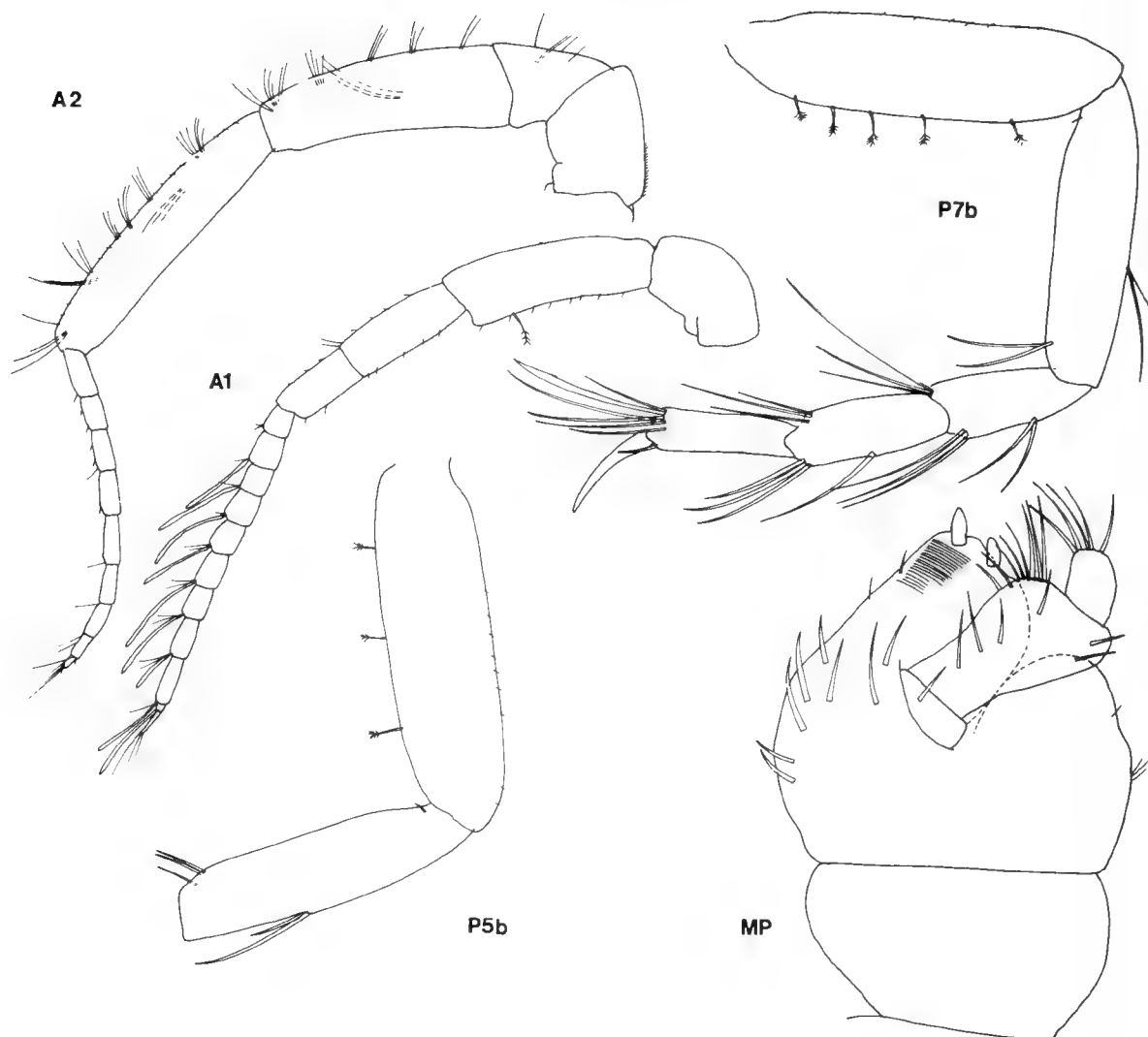


Figure 25. *Serolina kawina*. a, male holotype, 4.0 mm; b, female paratype, 4.3 mm, QM W11946.

Material examined. Holotype. Vic. Bass Strait, off entrance to Port Phillip Bay, 69 m, 1 Apr 1874 ("Challenger" stn 161), BMNH 1889:4:27:37 (σ , 5.0 mm, incomplete).

Other material. NSW. E of Burwood Beach ($32^{\circ}58'S$, $151^{\circ}45'E$), 22-24 m, 4 HDWBS stations, AM P23476 (1 ϕ), P24003-P24005 (3 $\sigma\sigma$). E of Belmont Beach ($33^{\circ}03'S$, $151^{\circ}45'E$), 23 m, HDWBS station, AM P24007 (1 σ). Jervis Bay, 15 m, sand, AM P35612-P35614, P35625, P35626(5).

Vic. Western Port, WBES stn 1733, NMV J6517(1). Woodside Beach ($38^{\circ}33'S$, $146^{\circ}59'E$), 20 m, NMV J6518(1 σ), J6520(3), J6792(3).

Bass Strait. Eastern and north-western regions, 66-122 m: 28 $\sigma\sigma$ (4.6-5.6 mm), 12 $\phi\phi$ (6.1-6.8 mm), 77 juveniles (2.9-5.9 mm), plus 54 other specimens from BSS stations 38, 47, 48, 55, 85, 118, 119, 120, 165, 171, 172, 178, 182, 201, 212; NMV J6263, J6264, J6454-J6460, J6556-J6558, J6560, J6753, J6754, J6762, J6792, J7132-7136, AM P34792-P34794.

Description. Male. Body 1.1 times as long as greatest width. Anterior margins of coxae 2-4 almost entirely overlapped by preceding coxae, posterodistal corners acute; coxae 4-6 and pleonal epimera 2 and 3 evenly spaced, a deep fissure between each, posterodistal corners becoming narrower posteriorly.

Head with pronounced posteriorly-directed triangular lobe and broad lateral lobes on posterior margin. Eye oval, with slight posterior eave. Pereonites 1-5 and pleonites 1-3 each with narrow erect mid-dorsal crest, extending as conical tubercles especially on pereonite 3 and pleonite 3, crest most elongate on pleonite 1. Pereonites

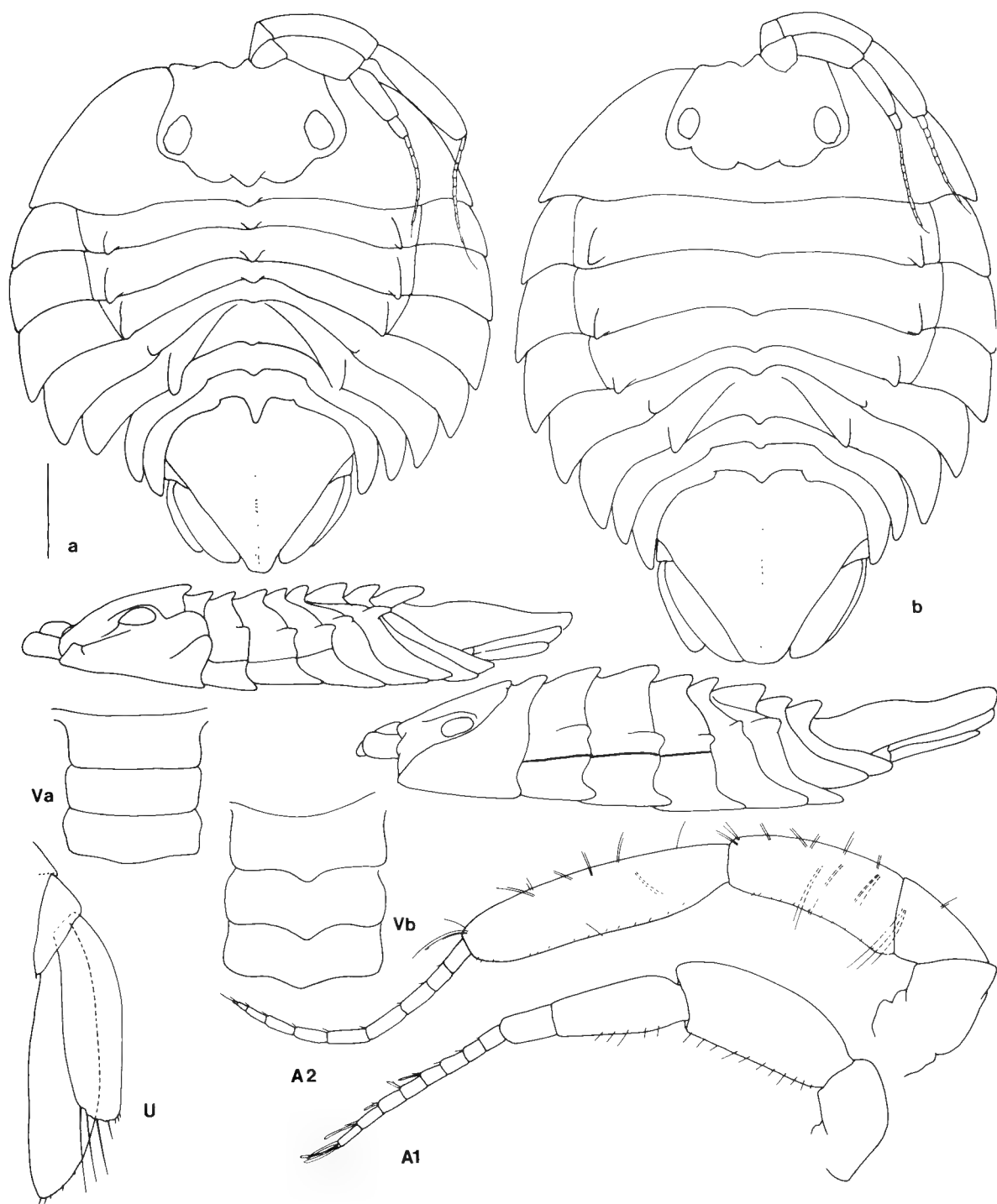


Figure 26. *Serolina minuta*. a, male, 5.3 mm, NMV J6264; b, female, 6.3 mm, NMV J6263.

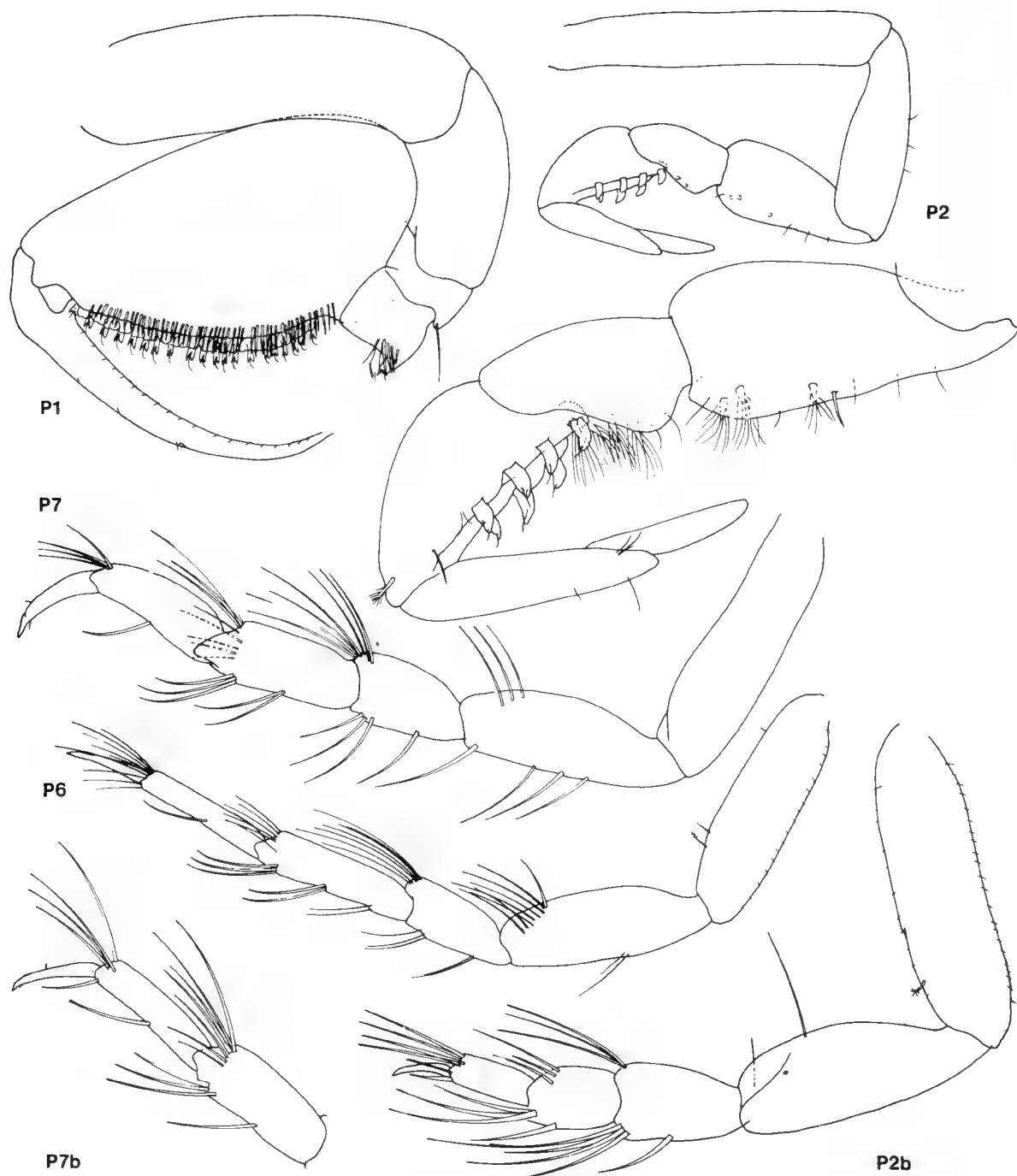


Figure 27. *Serolina minuta*, male, 5.3 mm, NMV J6264; b, female, 6.3 mm, NMV J6263.

2-6 with lateral crests overlapping each posterior margin; narrow on pereonites 2-4, smaller and triangular on pereonite 5, broadly-based and flat on pereonite 6. Pleotelson triangular, little wider

than long, lateral margin straight, apex acute; with sharp crest in midline, more prominent anteriorly.

Antenna 1 article 2 2.4 times as long as wide,

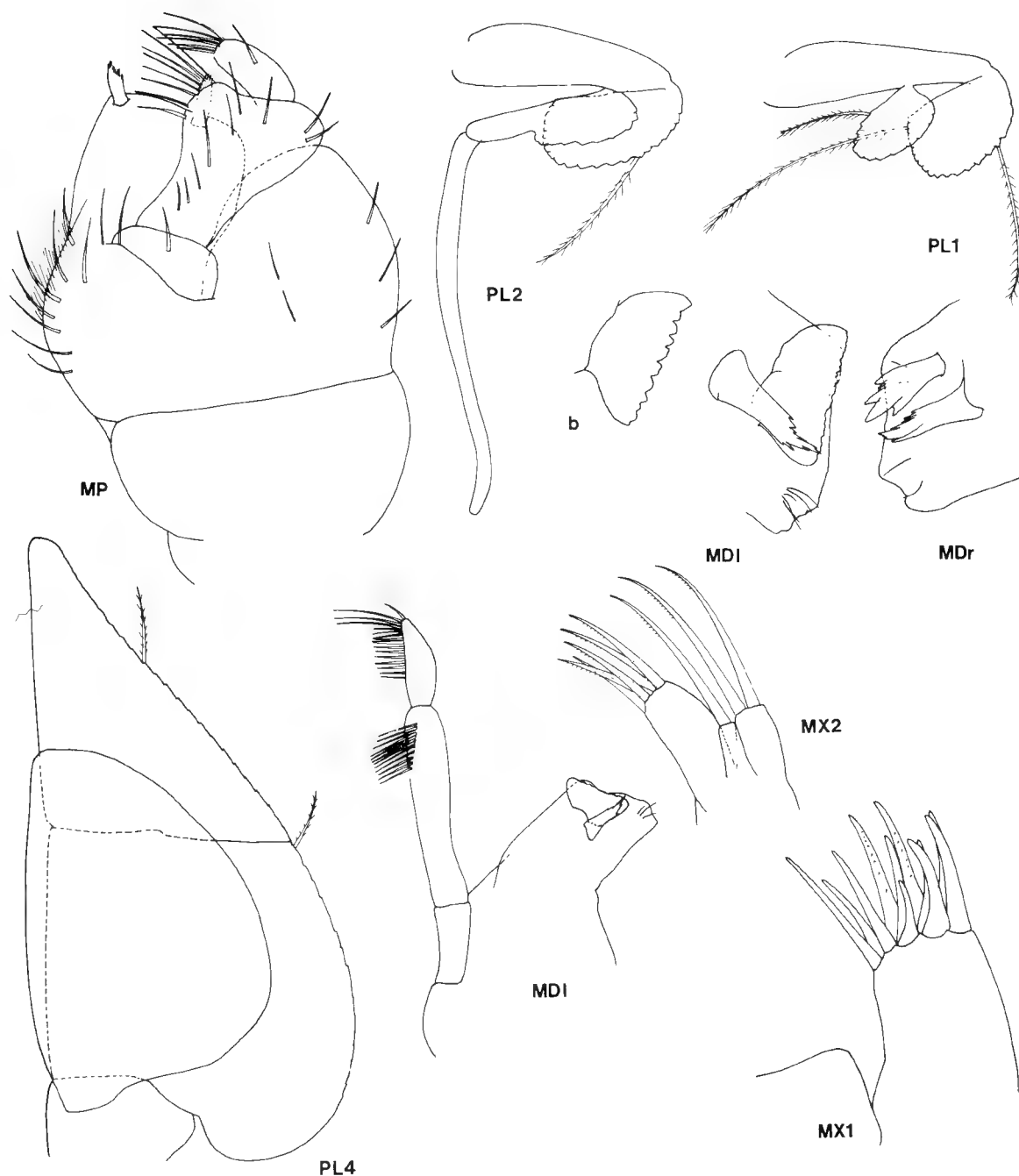


Figure 28. *Serolina minuta*, male, 5.3 mm, NMV J6264; X, female, 6.3 mm, NMV J6263 (left lacinia mobilis).

anterodistal corner produced; article 3 0.8 times length of article 2, clearly tapering; article 4 0.3 times length of article 3; flagellum of 9 articles, last 2 minute. Antenna 2 article 4 evenly taper-

ing; article 5 1.6 times length of article 4, 4.3 times as long as wide, of even width over most of length; flagellum of 10 articles.

Pereopod 2 articles 2 and 3 elongate; article 4

with 3 plumose setae; article 5 0.6 times length of article 4, posterior margin proximally lobed, with 4 plumose setae; article 6 tapering distally, posterior margin more or less straight, with 2 rows of 4 spines on proximal two-thirds; dactylus unguis attached near tip, almost half of whole length. Pereopod 6 articles 3-6 with anterodistal clusters of 6-8 setae and single seta and groups of setae along posterior margin; article 5 4.2 times as long as wide. Pereopod 7 articles 3-5 quadrate-linear, with anterodistal rows of 3-7 setae; article 6 tapering and slightly curved, single long seta at midpoint on posterior margin, 4 setae anterodistally; dactylus simple, tapering.

Pleopod 2 appendix masculina 2.5 times length of endopod. Uropod endopod tapering to subacute apex; exopod 0.7 length of endopod, subtruncate, with long apical setae.

Female. Body 1.3 times as long as wide. Coxae and epimera as in male. Head with medial and lateral pair of flat rounded, broadly based lobes on posterior margin. Pereonite and pleonite mid-dorsal and lateral sculpture as in male but less pronounced. Pleotelson as in male.

Pereopod 2 with broad articles (article 4 1.6 times as long as wide). Pereopod 6 of similar proportions to that of male. Pereopod 7 basal articles similar to those of male; article 6 narrower than in male, straight, with 2 posterior setae; dactylus narrow.

Distribution. Central and southern New South Wales, Victoria, Bass Strait; 15-122 m.

Remarks. The holotype male is in relatively good condition and can be reconciled with more modern material without difficulty. The species is most easily recognised by the prominent lateral lobes on pereonite 6. It might be confused with *S. eugeniae* but lacks the lateral ridges on the pleotelson. Posterior limbs of the adult male are little modified.

Serolina minuta is chosen as type for the new genus because the name has already been used to characterise a serolid group and because the species is well known and widespread.

Serolina nepea sp. nov.

Figures 29-31

Serolis minuta.—Whitelegge, 1901: 204, 208.—Monod, 1971:

325-328, figs. 1-3.—Holdich & Harrison, 1980: 376, 377, figs. 3C, 3D, 3G, 3H. (not *Serolis minuta* Beddard, 1884)

Material examined. Holotype. Tas. Bass Strait, E of Flinders Island (39°44.8'S, 148°40.6'E), 124 m, fine sand and mud, epibenthic sled, G. Poore et al. on RV "Tangaroa", 14 Nov 1981 (BSS stn 167), NMV J6751 (♂, 4.6 mm).

Paratypes. Type locality, NMV J6752 (♀, 5.0 mm), J6767 (11 ♂♂, 3.3-4.6 mm), NMV J6768 (24 ♀♀, 3.6-5.4 mm), NMV J6769 (20 juveniles, 2.4-3.7 mm, AM P34795 (2 ♂♂, 2 ♀♀, 5 juveniles), LACM 3000 (1 ♂, 1 ♀, 1 juvenile), USNM 221525 (1 ♂, 1 ♀, 1 juvenile).

Other material. Qld. Off Brisbane, 136 m, 28 Jul 1968, ("Nimbus" stn 25), AM P20193 (1 ♀).

NSW. Off Ulludulla, 75 m, trawl, K. Sheard, 7 Jun 1944, SAM C4034 (♂, ♀). Sydney, E of Malabar, 66 m, 29 Jan 1974 (AMSBS stn V), AM P22984 (♀). Off Jibbon Head, 84-99 m, sand/mud, 12 Mar 1898 ("Thetis" stn 38), AM P2265 (♂). Off Port Jackson, 82 m, dredge, R. Springthorpe et al., 11 Dec 1980 (stn K80-20-11), AM P32165 (19 ♂♂, 3.9-4.7 mm; 18 ♀♀, 4.0-5.2 mm; 17 juveniles).

Bass Strait. Eastern slope and north-eastern region, 58-174 m: 1 ♂, 2 ♀♀, 14 juveniles from BSS stations 32, 38, 84, 165, 170 and 177, NMV J6770-J6773, J6793-J6794, J11957.

Tas. E of Maria Is., 50 m, fine bryozoa and shell, 23 Apr 1985 (stn TAS29), NMV J11936(35); 75 m, fine bryozoa and shell, 23 Apr 1985 (stn TAS30), NMV J11937(2). 15 km E. of South Bruny Is., 82 m, 22 Oct 1984, NMV J11956(12).

SA. Cape Jaffa, 164 m, SAM C394(1 ♂).

Description. Male. Body 1.1 times as long as wide. Coxae 1-4 with acute posterolateral corners slightly separate from following coxae; coxae 4-6 separated by deep angular fissures; coxa 6 separated from pleonal epimera 2 and 3 by broad angle; epimera narrowly acute.

Head with prominent mid-dorsal conical projection (especially pronounced in juveniles); eye narrow, reniform, without eave, defined by broad shallow groove. Pereonites 1-5 and pleonites 1-3 with mid-dorsal conical crests, most prominent on pereonite 1 and pleonite 1. Pereonites 1-4 with lateral subconical bosses; mid-lateral margins with irregularly-spaced blunt tubercles. Pleotelson broad, tapering abruptly; margins concave distally; apex rounded; with mid-dorsal crest most prominent anteriorly; with dorsolateral curved ridges on each side.

Antenna 1 article 2 2.9 times as long as wide; distal margin slightly oblique; article 3 0.4 times length of article 2, widest sub-proximally; article 4 1.4 times length of article 3; flagellum of 8 articles, last minute. Antenna 2 article 4 evenly tapering, curved; article 5 1.5 times length of article 4, 6.0 times as long as wide, tapering over distal half; flagellum of 10 articles.

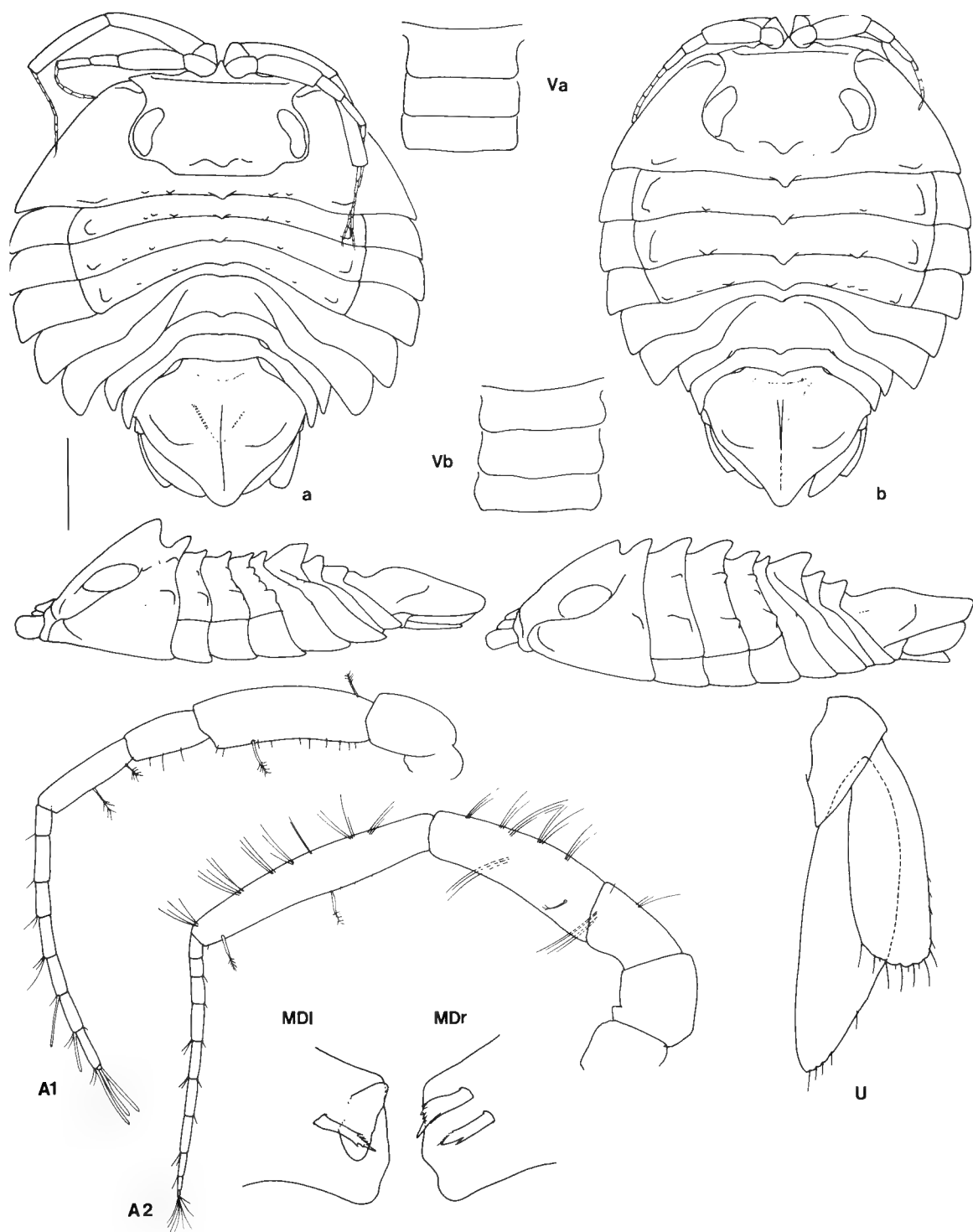


Figure 29. *Serolina nepea*. a, male holotype, 4.6 mm; b, female paratype, 5.0 mm, NMV J6752.

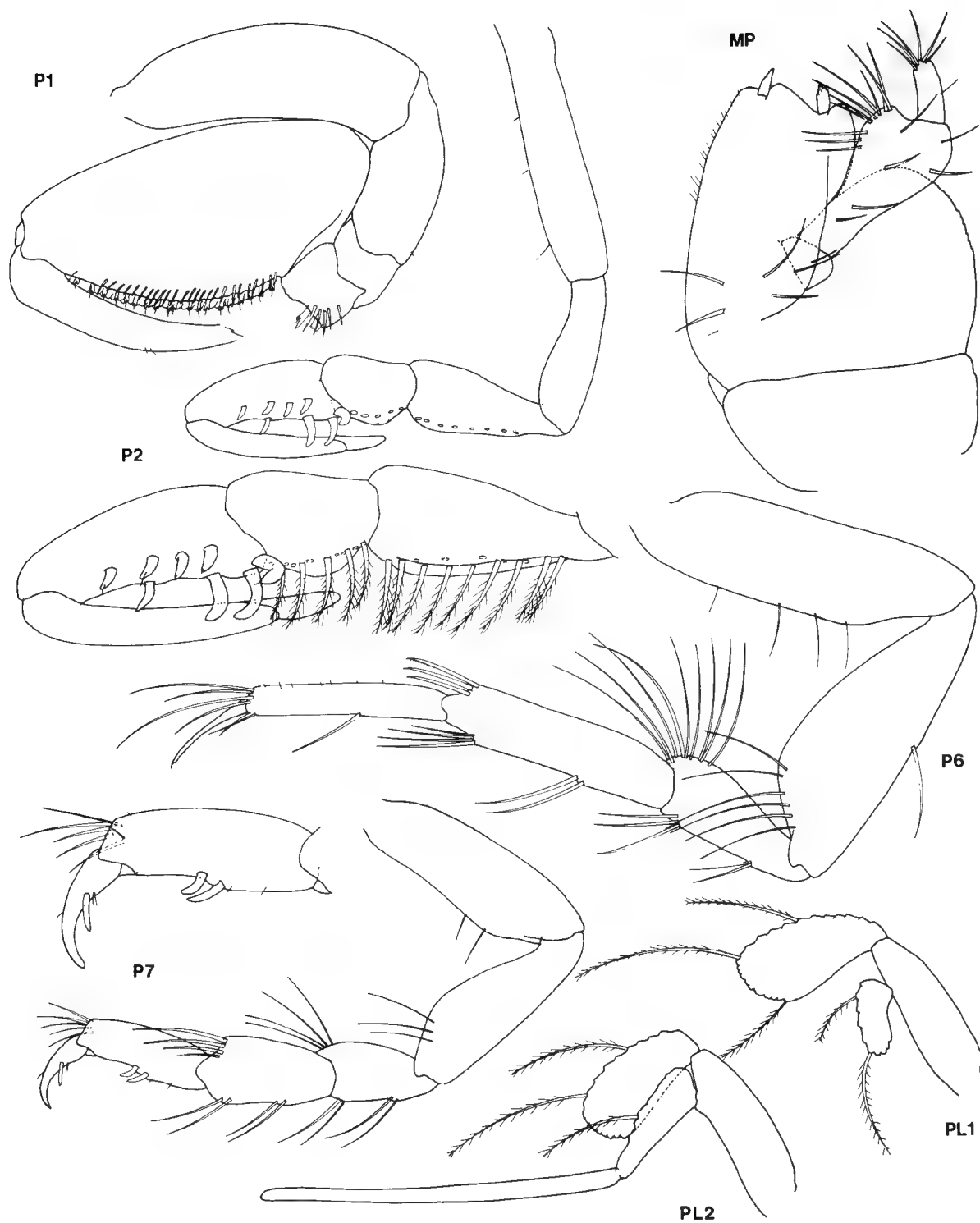


Figure 30. *Serolina nepea*, male holotype, 4.6 mm.

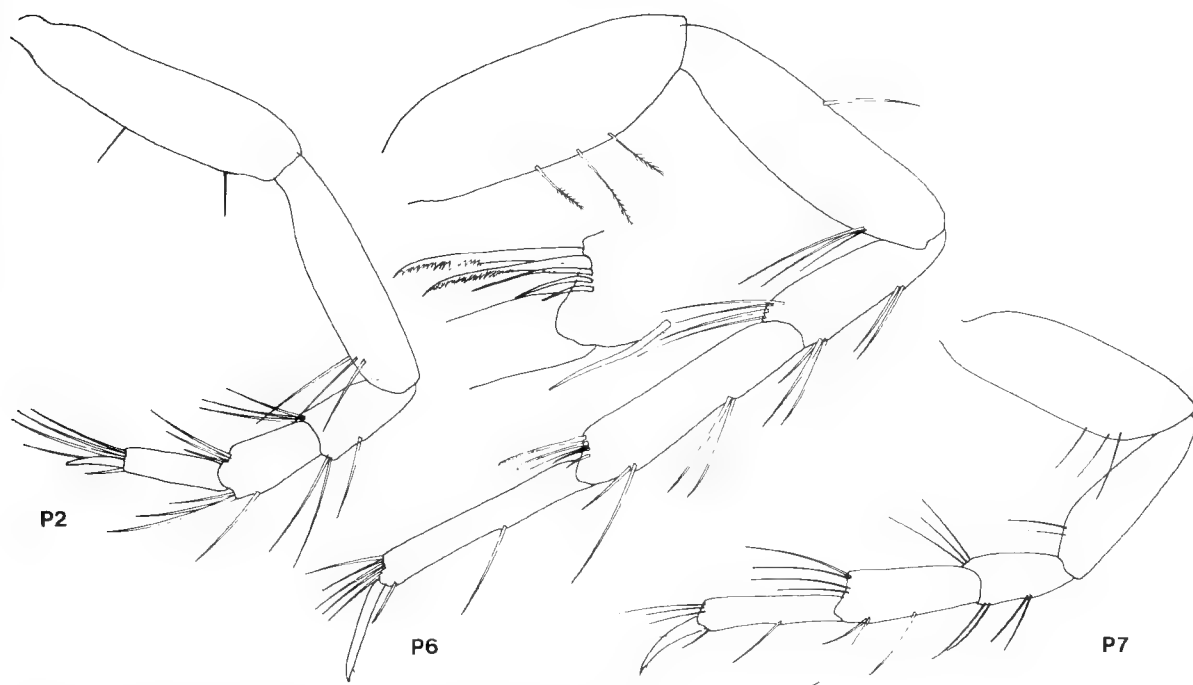


Figure 31. *Serolina nepea*, female paratype, 5.0 mm, NMV J6752.

Pereopod 2 article 3 much shorter than article 2; article 4 with 14 plumose setae in 2 rows; article 5 0.7 times length article 4, posterior margin strongly convex, with 11 plumose setae in 2 rows; article 6 tapering, posterior margin irregularly concave, with 8 spines unevenly arranged; dactylus unguis attached subapically, about one-third of whole length. Pereopod 6 article 3 anteriorly lobed; articles 3 and 4 with anterior row of simple setae; article 5 4.0 times as long as wide. Pereopod 7 articles 2 and 3 anteriorly lobed; articles 3-5 with distal setal row anteriorly; article 6 rectangular, with 2 short curved spines at midpoint on posterior margin; dactylus simple, hooked, with straight spine at midpoint on posterior margin.

Pleopod 2 appendix masculinis 3.0 times length of endopod. Uropod endopod elongate, apically tapering to acute apex; exopod 0.7 times length of endopod, obliquely rounded apex with long apical setae.

Female. Body 1.25 times as long as wide. Coxae and pleonal epimera overlapping more and squarer than in male. Head mid-dorsal cone less pronounced than in female. Pleonites 1-5 and pleonites 1-3 with prominent mid-dorsal crests,

most pronounced on pleonite 1. Pereonites 1-4 with lateral crests and single (rarely multiple) midlateral bosses, most pronounced on pereonite 4. Pleotelson as in male.

Pereopod 6 with basal articles more linear than in male. Pereopod 7 distal articles more elongate than in male; article 6 more elongate and with single mid-posterior seta; dactylus fine.

Distribution. Southern Queensland to South Australia, including Bass Strait and Tasmania; 58-174 m.

Remarks. *Serolina nepea* shares with the much larger species *S. delaria* midlateral sculpture on the pereonites. It is also notable for having article 4 of antenna 1 longer than article 3. The male pereopod 7 carries two strong setae on the propodus. The species is confined to deeper parts of the shelf.

Serolina orriella sp. nov.

Figures 32-34

Material examined. Holotype. NSW. 1 km E of Belmont Beach (33°03'S, 151°41'E), 22 m, grab, 20 Sep 1975 (HDWBS station), AM P23478 (♂, 4.6 mm).

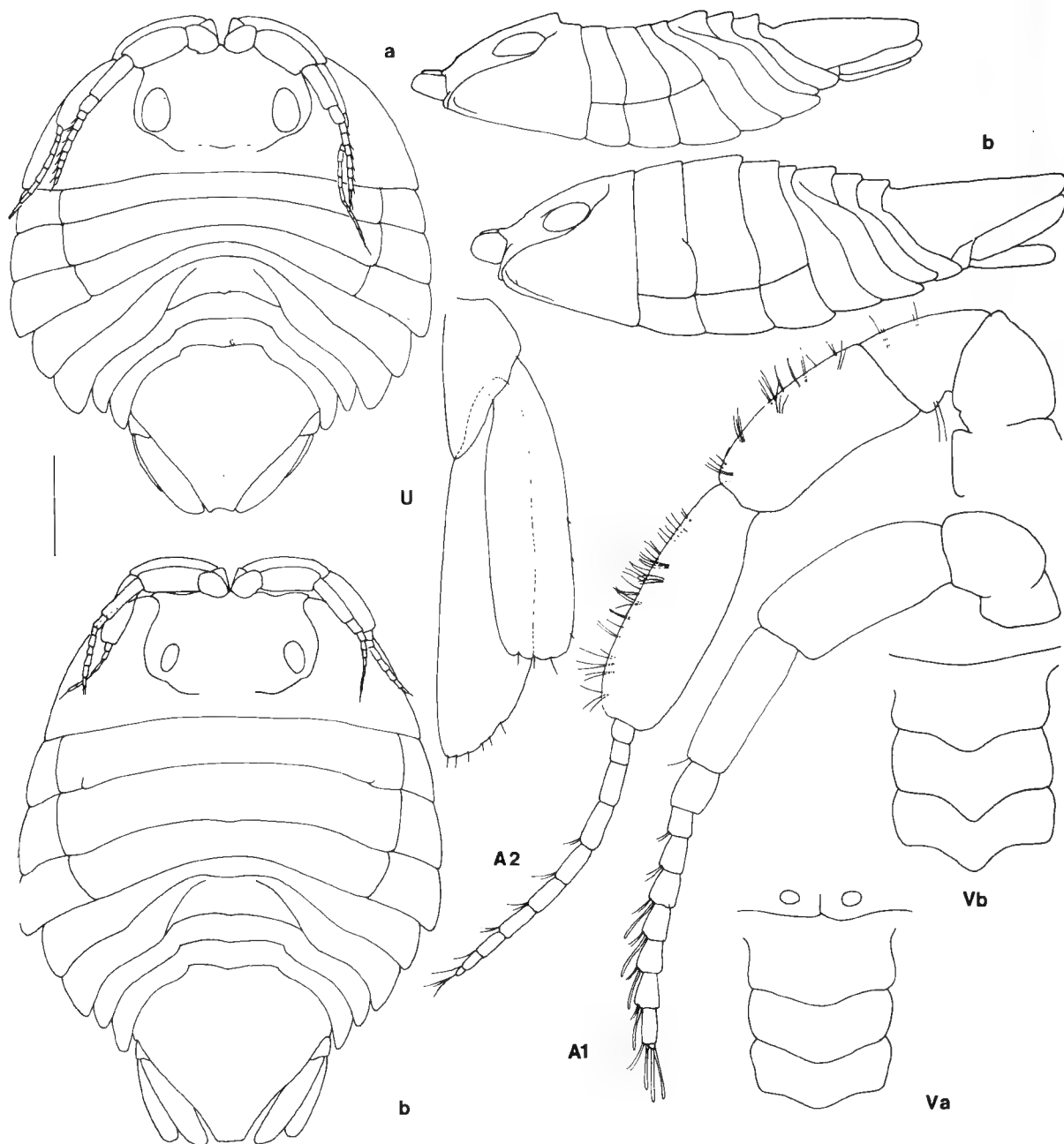


Figure 32. *Serolina orriella*. a, male holotype, 4.6 mm; b, female paratype, 5.4 mm, AM P34797.

Paratypes. NSW. Type locality, AM P34797 (♀, 5.4 mm). 1-1.5 km E of Belmont Beach, 18-23 m, 1975-1976 (HDWBS stations), AM P23479 (♀, 6.0 mm), P24000 (♀, 5.1 mm; juvenile, 3.5 mm), P24006 (♀, 3.8 mm), P24013 (♂), NMV J7696 (♂, 4.4 mm; ♀, 5.1 mm), J7697 (♂, 4.7 mm; juvenile, 3.7 mm). 1-1.5 km E of Burwood Beach (32°58'S, 151°45'E), 20-26 m, 1975-1976 (HDWBS stations), AM P23474 (2 juveniles), P23475 (♀, 5.5 mm), P23477 (juvenile), P24010

(juvenile, 3.8 mm), P24012 (submale). 1.5 km E. of McMasters Beach, 20 m, 1975 (HDWBS stations), AM P24001 (juvenile, 3.4 mm), P24002 (2 ♂♂, 4.5, 5.2 mm; ♀, 5.7 mm).

Other material. SA. 3.8 km W of Tiparra Light, Tiparra Reef (34°10'S, 137°23'E), 10 m, G.C.B. Poore and H.M. Lew Ton, SCUBA, 15 Oct 1985 (stn SA10), NMV J11935 (10 juveniles, 2.5-5.4 mm).

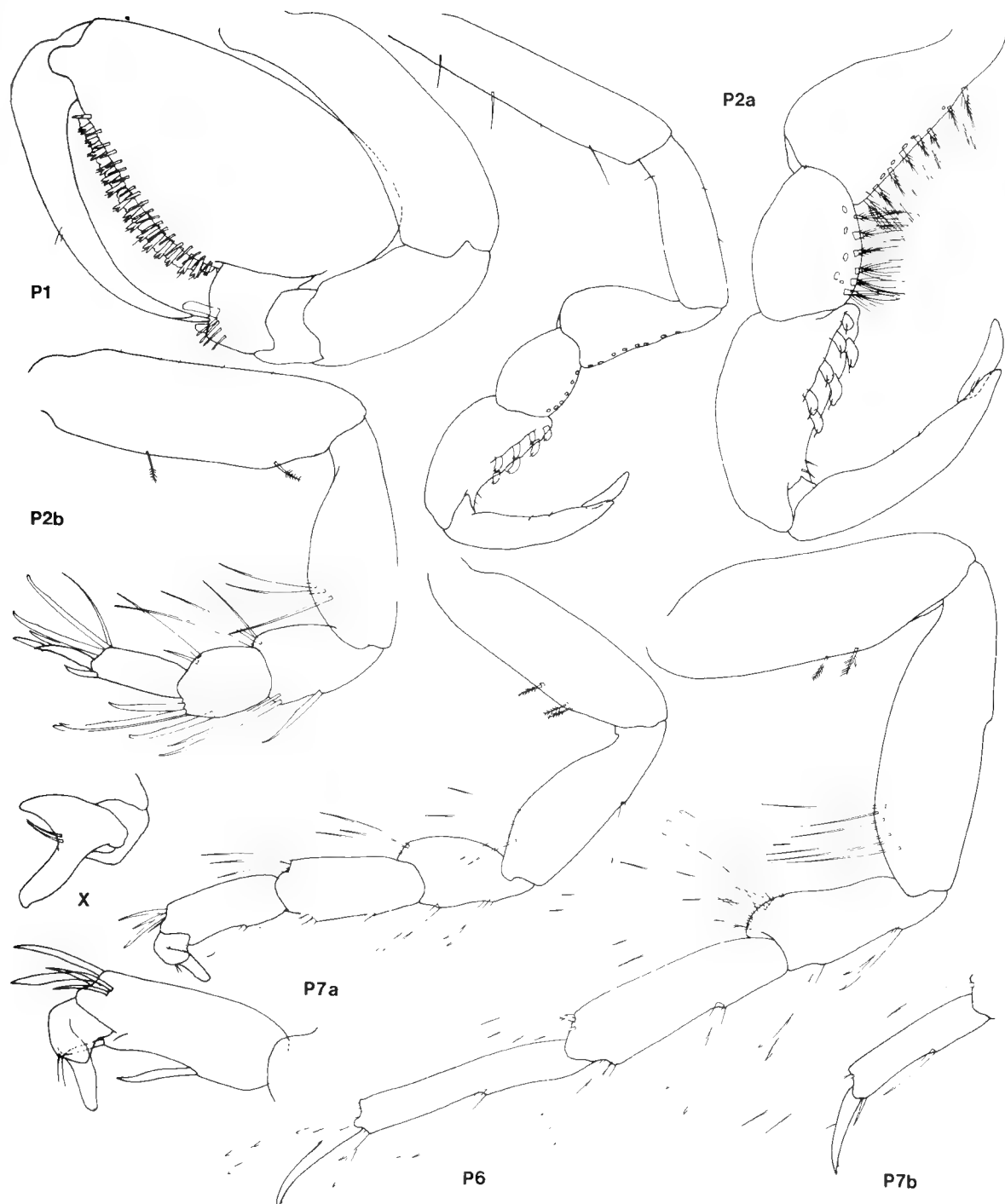


Figure 33. *Serolina orriella*. a, male holotype, 4.5 mm; b, female paratype, 5.4 mm, AM P34797; X, distal view of right pereiopod 7 dactylus holotype.

Description. Male. Body 1.1 times as long as wide. Coxae 1-4 forming more or less continuous margin; coxae 5 and 6 and epimera 2 and 3 more posteriorly directed, short narrow fissure following coxa 6 and epimeron 2.

Head with slightly elevated medial boss on posterior margin, obscure lateral lobes; eye ovoid, very low. Pereonites 1-5 with no mid-dorsal sculpture; pleonites 1-3 with very low broad rounded crests. Pereonites and pleonites with no lateral sculpture. Pleotelson with low even mid-dorsal crest; lateral margins straight; apex slightly concave.

Antenna 1 article 2 2.3 times as long as wide, distal margin slightly oblique; article 3 0.8 times length of article 2, slightly tapering; article 4 0.3 times length of article 3; flagellum of 8 articles, last minute. Antenna 2 article 4 tapering abruptly near end; article 5 1.3 times length of article 4; 3.3 times as long as wide, elongate-ovate; flagellum of 10 articles.

Pereopod 2 article 3 shorter than article 2; article 4 with 15 plumose setae in 2 rows; article 5 0.6 times of article 4, ovate, with 11 plumose setae in 2 rows; article 6 tapering distally, its posterior margin concave, with 7 spines on proximal half; dactylus unguis attached subapically, about one-third of total length. Pereopods 5 and 6 with article 3 broadly lobed anteriorly, article 4 with about 10 tubular setae on anterodistal lobes; article 5 3.8 times as long as wide. Pereopod 7 articles 3-5 with anterodistal clusters of setae and stout spines posteriorly; article 6 rectangular, with seta midposteriorly and distoposteriorly and setae distally; dactylus bilobed, mesial lobe little shorter than the lateral.

Pleopod 2 appendix masculina 2.7 times length of endopod. Uropod endopod elongate, apex tapering; exopod 0.8 times length of endopod, rounded-truncate, with short apical setae.

Female. Body 1.3 times as wide. Coxae as in male, pleonal epimera little more produced posteriorly. Head and mid-dorsal crest with obscure ornamentation. Pereonite 2 with low marginal lateral lobes. Pereopods 5 and 6 marginally more elongate than in male, without tubular setae. Pereopod 7 with simple narrow article 6; dactylus simple.

Distribution. Central New South Wales and

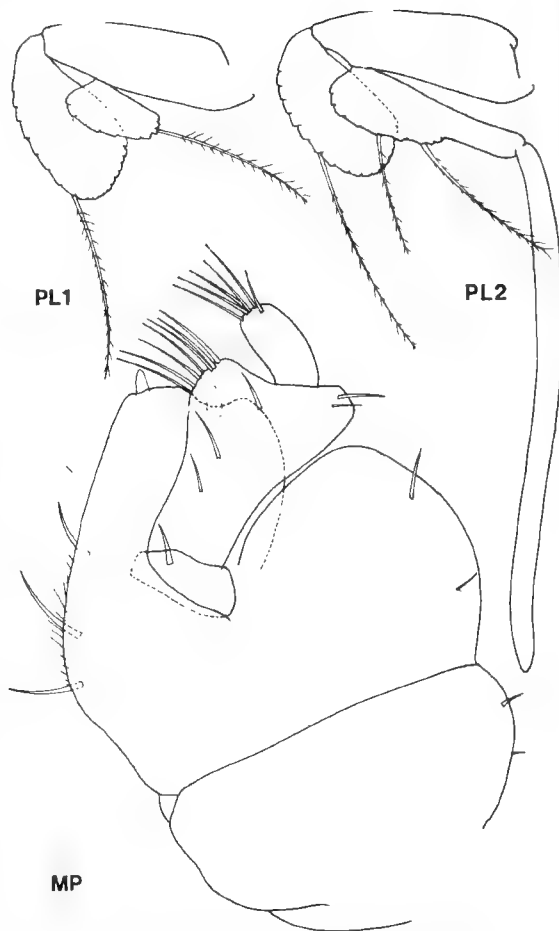


Figure 34. *Serolina orriella*, male holotype 4.6 mm.

South Australia; 10-23 m.

Remarks. *Serolina orriella* is a particularly smooth species but the male is easily recognised by its bifid dactylus on pereopod 7. The species differs from all others in having a disjunct distribution. In spite of intensive sampling which collected about 17 species of serolids in Bass Strait *Serolina orriella* was not found.

Serolina yongei (Hale) comb. nov.

Figures 35-37

Serolis yongei Hale, 1933: 560-561, fig.—Sheppard, 1933: 334-336.—Holdich & Harrison, 1980: 373, 374, 376, 380, 382-384, fig. 6A.—Harrison & Poore, 1984: 13. (not *Serolis yongei*.—Monod, 1971 = *Serolis elongata*).

Material examined. Holotype. Qld. Outside Trinity Opening (16°17'S, 146°02'E), about 200 m, bottom stramin net, 24 Nov

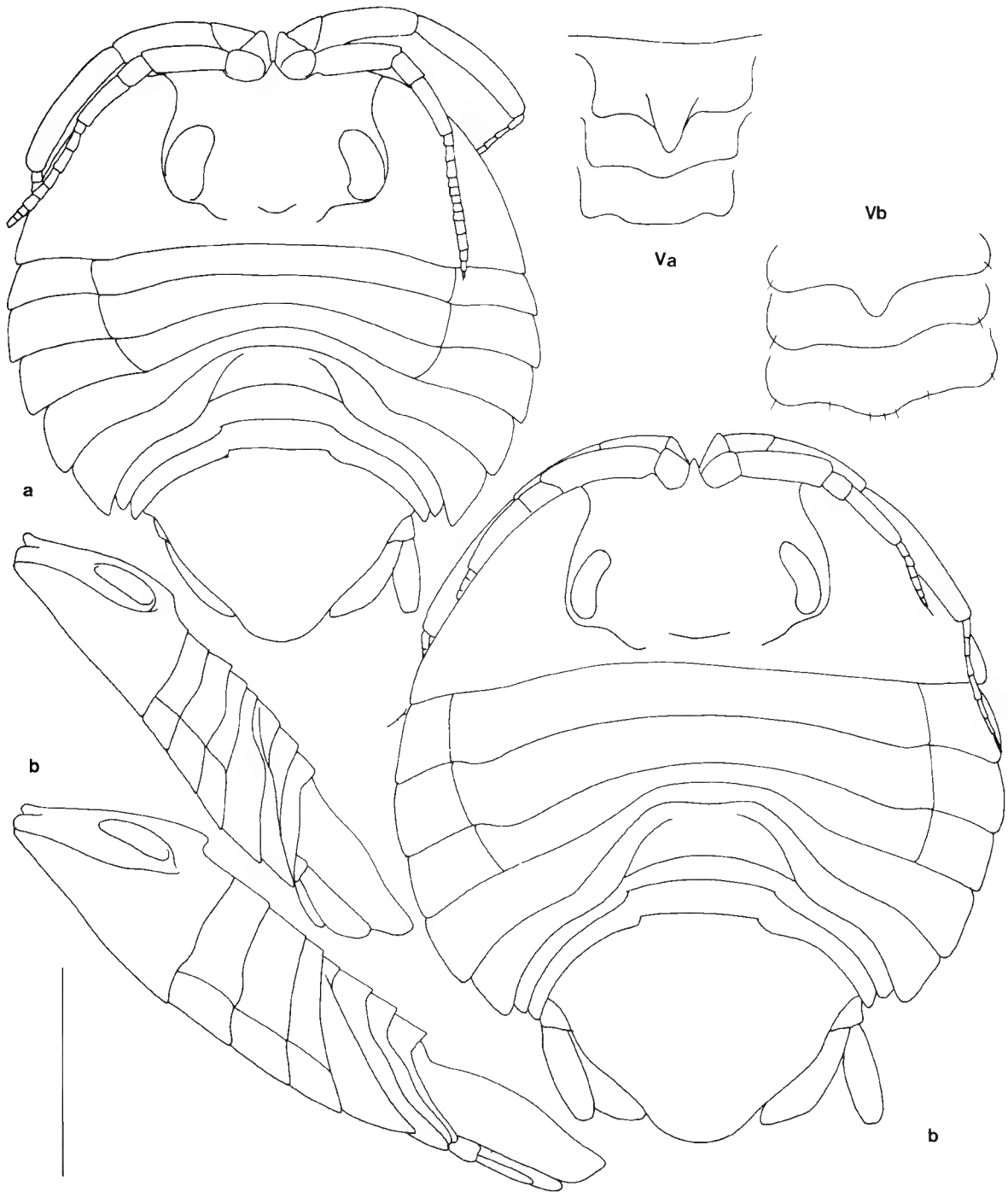


Figure 35. *Serolina yongei*. a, male, 2.8 mm, AM P34786; b, female, 3.3 mm, AM P34787.



Figure 36. *Serolina yongei*. a, male, 2.8 mm, AM P34786; b, female, 3.3 mm, AM P34787; X, distal view of right pereopod 7 dactylus male.

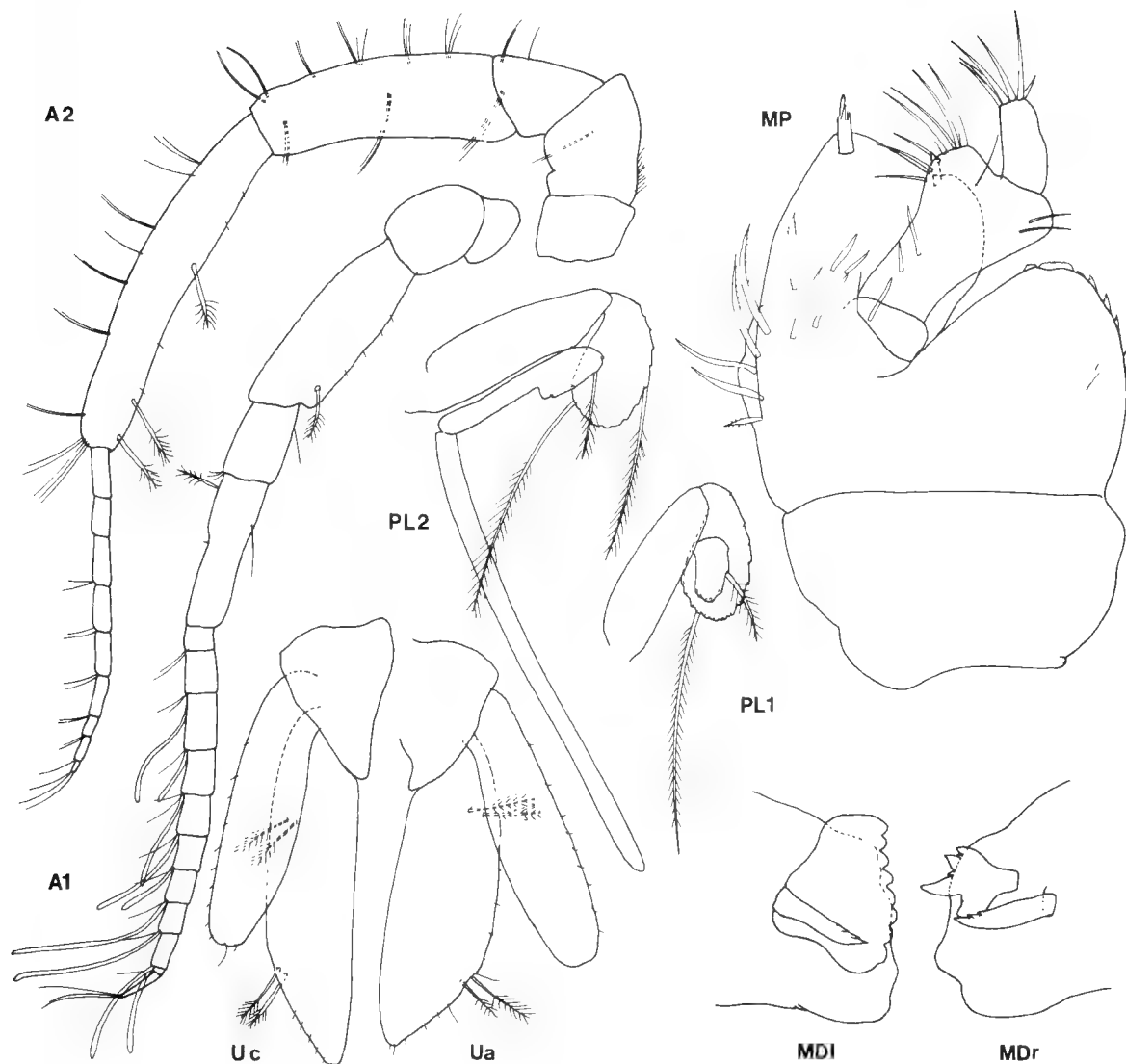


Figure 37. *Serolina yongei*. a, male, 2.8 mm, AM P34786; c, holotype female, 3.0 mm.

1928 (Great Barrier Reef Expedition, 1928-29, plankton station 29), BMNH 1933:9:20:6 (non-ovigerous ♀, 3.0 mm).

Paratype. Type locality, BMNH 1933:9:20:7 (post-manca, 2.1 mm).

Other material. Qld. SE of Cairns (17°14'S, 146°39'E), 155-182 m, muddy sand, dredge, R. Springthorpe et al. on HMAS "Kimbla", 12 Oct 1981 (stn C-17), AM P34786 (♂, 2.8 mm), P34787 (♀, 3.3 mm), P32166 (1 juvenile, 3 ♀♀, 2.7-3.5 mm), NMV J7143 (1 ♂, 2 ♀♀). NE. of Lady Elliott Is. (24°03.7'S, 152°49'E), 150 m, rubble, dredge, P. Coleman et al. on HMAS "Kimbla", 4 Jul 1984, AM P36746(5), NMV J11970 (♂), J11971 (♀).

Description. Male. Body 1.1 times as long as wide. Coxae 1-6 closely applied, margins evenly

curved; coxa 6 and pleonal epimera 2 and 3 separated by shallow fissures; posterodistal corners of coxae and epimera never very acute.

Head with vaguely three-lobed, low posterior margin. Eye reniform, slightly elevated. Pereonites and pleonites with no dorsal sculpture. Pleotelson broadly subtriangular, apex broadly rounded, lateral margins gently expanded at proximal third, dorsally smooth.

Antenna 1 article 2 3 times as long as wide, anterodistal corner produced; article 3 0.3 length of article 2; article 4 twice length of article 3;

flagellum of 11 articles, last 2 minute. Antenna 2 article 4 tapering and curved; article 5 1.5 times length of article 4, about 6 times as long as wide, of even width over most of length; flagellum of 9 articles.

Pereopod 2 articles 2 and 3 elongate; article 4 with 9 plumose setae in 2 rows, posterodistally lobed; article 5 0.6 times length of article 4, posterodistally lobed, with 11 plumose setae in 2 rows; article 6 ovate, with 5 spines widely spaced on posterior margin; dactylus stout, unguis attached apically, one-quarter of whole length. Pereopod 6 articles 3-6 with anterodistal clusters of 1.4 setae; article 5 5 times as long as wide. Pereopod 7 articles 3-5 quadrate-linear, with anterodistal rows of 1-4 setae; article 6 with 2[1 setae on posterior margin; dactylus short, falcate, apically bifid.

Pleopod 2 appendix masculina 2.7 times length of endopod. Uropod endopod tapering distally to acute apex; exopod 0.8 times length of endopod, tapering distally to truncate-rounded apex, with minute lateral setae.

Female. Body very slightly broader than in male, coxae and epimera as in male. Head with moderately low vaguely 3-lobed posterior margin. Pereonites 1-3 with very obscure lateral bosses; pereonites 2 and 3 with lateral marginal lobes, not at all elevated.

Pereopod 2 with narrow articles (article 4 twice as long as wide). Pereopod 6 of similar proportions to that of male. Pereopod 7 basal articles of similar proportions to those of male; article 6 and dactylus much narrower and elongate.

Distribution. Off central and northern Queensland coast; 155-200 m.

Remarks. The holotype, a non-ovigerous female with small oostegite buds, and the paratype manca were compared with more recently collected specimens. Consistent similarities in shape, pleotelson, profile and antenna 1 confirmed their identity. The only differences were in the shape of the uropodal rami, narrower in the type (Fig. 39). The species is notable for the long antenna 1 article 4 and the triangular margin of pleonal sternite 1.

The species is confined to deep water on the shelf.

Serolina sp.

Serolis sp.—Holdich & Harrison: 380, figs. 4G, 4H.

Material examined. Qld. Capricorn Channel (23°11.5'S, 152°4.5'E), 188 m, thick blue/grey mud, AM P27338 (♂, 3.4 mm).

Remarks. This single male is similar to *S. kawina* in being largely without any dorsal sculpture but the limbs differ in several respects. The sixth coxa is shorter than in *S. kawina*; the antennal peduncles are broader; the uropodal exopod is shorter; the propodus of pereopod 2 is broader; article 2 of pereopod 5 is lobed as in *S. kawina* but article 3 lacks the transverse ridges; and the dactylus of pereopod 7 is simple.

The specimen comes from a much deeper habitat than *S. kawina* so it is not surprising that it does not belong to this species. Its description awaits more material.

Acknowledgements

I am especially grateful to Keith Harrison for the valuable ideas which led to this study and for his useful comments on the manuscript.

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RHIZOECUS (INSECTA: HOMOPTERA: PSEUDOCOCCIDAE)
FROM AUSTRALIA WITH A DESCRIPTION OF A NEW SPECIES
DAMAGING GARDEN PLANTS IN VICTORIA

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Abstract

Williams, D. J., 1987. *Rhizoecus* (Insecta: Homoptera: Pseudococcidae) from Australia with a description of a new species damaging garden plants in Victoria. *Mem. Mus. Vict.* 48: 191-194.

The six Australian species of the hypogeic mealybug genus *Rhizoecus* are discussed, including *R. cobelopus*, a new species causing damage to garden plants in Victoria. This new mealybug is the second endemic species to be found in Australia. A key is presented to separate all the Australian species.

Introduction

The hypogeic mealybug *Rhizoecus* Künckel d'Herculis, includes about 80 species and, although it is cosmopolitan, most of the species described so far are from the New World (Hambleton, 1976). Eight species are known from New Zealand (Cox, 1978) and in a recent publication Williams (1985) discussed the five known species from Australia, a small proportion of the 196 species of mealybugs described already in Australia.

Only one species of *Rhizoecus*, *R. sphagni* Williams, collected in Victoria in 1979, appears to be endemic. *R. cacticans* (Hambleton), *R. dianthi* Green and *R. falcifer* Künckel d'Herculis have been reported in various parts of the world and are recent introductions to Australia. The earliest collection date for *R. rumicis* (Maskell) in Australia is 1933, but this species was proba-

bly introduced from New Zealand where it is common and recorded in 1892.

Australia has a rich and varied mealybug fauna and many more species await discovery. When the soil fauna is investigated more thoroughly further species of *Rhizoecus* will almost surely be found. It is not the intention to describe new species of mealybugs as they are discovered but recently one such species, submitted to the Commonwealth Institute of Entomology for identification, has been found in Victoria causing serious damage to garden plants. This would be sufficient reason to describe it but the species is of added interest in lacking completely the tritubular and bitubular pores, characters normally associated with the genus and discussed for other species of *Rhizoecus* by Williams (1985).

Key to Australian species of *Rhizoecus*

1. Circulus present 2
- Circulus absent 3
2. Multicolour disc pores absent, tritubular pores present
..... *R. cacticans* (Hambleton)
- Multicolour disc pores present on dorsum and venter, bitubular pores present
..... *R. rumicis* (Maskell)
3. Antennae 5-segmented, eyes absent *R. falcifer* Künckel d'Herculis
- Antennae 6-segmented, eyes present but sometimes very small 4

4. Multilocular disc pores few, confined to posterior abdominal segments of venter *R. dianthi* Green
- Multilocular disc pores abundant on dorsum and venter 5
5. Tritubular pores present, cephalic plate not apparent *R. sphagni* Williams
- Tritubular pores absent, cephalic plate well developed and conspicuous *R. cobelopus* sp. nov.

Pseudococcidae Cockerell, 1905

Rhizoecus Künckel d'Herculaïs, 1878

***Rhizoecus cobelopus* sp. nov.**

Figure 1

Material examined. Holotype: Victoria, Nunawading, 20 km E. of Melbourne, on roots of various garden plants, A. Neboiss, 22 May 1985, Museum of Victoria (NMV), Reg. no. T-8908(♀).

Paratypes: Victoria, same data as holotype; (NMV T-8909-T-8913, 5 ♀♀; BMNH 5 ♀♀). Same locality, 1 Jan 1985 (NMV T-8914-T-8917, 4 ♀♀; BMNH 4 ♀♀).

Description. External appearance of adult female on roots of plants: covered with white flocculent wax as though roots are covered with white strings. When prepared on microscope slides: body elongate-oval, largest specimens about 1.6 mm long. Anal lobes poorly developed, membranous, each with 2 dorsal and 1 ventral seta about 65 µm long, forming a group of 3. Antenna 160-180 µm long, with 6 segments, apical segment 40 µm long, tapering. Legs well developed, slender. Hind trochanter+femur 140-160 µm long, hind tibia+tarsus 160-170 µm long, claw unusually slender, 28-32 µm long with digitules short and seta-like. Ratio of lengths of hind tibia+tarsus to trochanter+femur 1.06-1.14. Ratio of lengths of hind tibia to tarsus 1.28-1.42. Second and third legs with spine-like distal setae on anterior surface of tibia and on inner edge of tarsus. Labium 90-100 µm long, about same length as clypeolabral shield. Circulus absent. Cephalic plate conspicuous, sclerotised, often containing 1 or 2 setae, trilocular pores and multilocular disc pores. Eyes present, small. Anal ring 65-70 µm wide, with 6 setae, each 65-70 µm long, and with inner and outer row of pores. Ostioles with inner edges of lips sclerotised, each lip with 1-4 setae and 1-4 trilocular pores.

Dorsal surface with slender setae in moderate numbers, 12-20 µm long, except towards posterior

end of body where they are often 35 µm long. Trilocular pores in an even distribution, not numerous. Multilocular disc pores abundant in bands across the segments, absent in the inter-segmental areas. Bitubular and tritubular pores absent. Minute ducts present, few, sclerotised, in more or less single rows across segments, each duct narrower than a trilocular pore and with external rim that is wide but thin.

Ventral surface with similar setae to those on dorsum, but fewer. Multilocular disc pores not so numerous as on dorsum, following the general pattern of the setae. Trilocular pores sparse. Tubular ducts, as on dorsum, represented by 1 or 2 near each spiracle on thorax, there being rarely more than 5 across the middle of each abdominal segment.

Etymology. From the Greek *kobe* (needle) and *pous* (foot) referring to the long slender claw.

Remarks. In its general distribution of multilocular disc pores, this species resembles *R. sphagni* described from Victoria. The new species differs in lacking completely any tritubular pores but it does possess minute ducts with a wide and thin external rim. These ducts may be modified monotubular pores replacing the normal tritubular pores. Furthermore, the new species has a distinct cephalic plate that is absent in *R. sphagni*.

The insects damage the root system, particularly the fine root tips, and even roots of 4 or 5 mm diameter. The roots eventually rot. Native plants attacked are *Prostanthera* sp., *Grevillea* sp. and *Eucalyptus* sp., but introduced plants, *Azalea* sp., *Viburnum* sp. and *Ilex* sp., are also infested. The host-plant range may be large because the ground has been reported full of the mealybugs between root systems. There is reason to believe that the mealybug may have been introduced with some soil or plants from elsewhere in Australia.

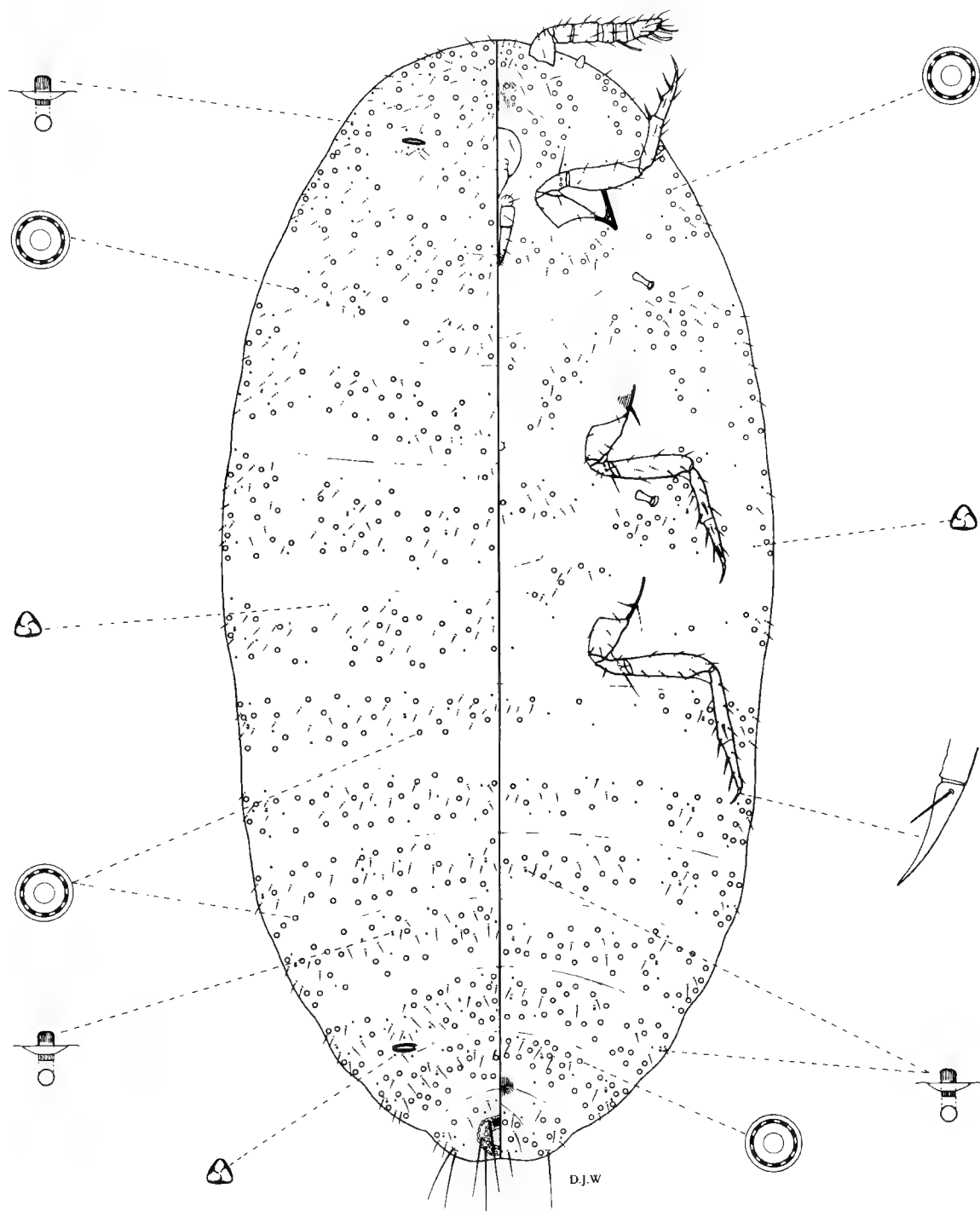


Figure 1. *Rhizoecus cobelopus* sp. nov., adult female holotype (slide-mounted specimen). Dorsal surface on left, ventral surface on right.

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